Holding Bankers Liable:

Personal Guarantees and Risk-taking in Security Underwriting*

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February 14, 2026

Abstract

Does additional liability for bank executives improve risk management? We address this question using uniquely detailed data on the underwriting activities of one of the largest Dutch banks in the early 20th century. Its executives faced additional liability as they partially guaranteed their banks' security underwriting. If the issuance was successful, they received the underwriting fee; if it failed, they had to personally purchase securities at a loss. Exploiting exogenous discontinuities in the size of these guarantees, we find that issuance quality was higher for larger guarantees. Investor subscription rates were higher, issuing firms had stronger balance sheets, and subsequent security returns were higher. Results indicate that additional liability directly tied to executives' decisions can help reduce bank risk-taking.

Keywords: Limited liability, Executive compensation, Bank risk taking, Financial history

JEL Codes: G21, M12, N24

*We are grateful for useful suggestions and comments from Luisa Bicalho Ritzkat, Chris Colvin, Martin Götz, Abe de Jong, Gary Richardson, Peter Roosenboom, Patrick Verwijmeren and seminar and conference participants at the GGDC 2024, RUG FEB Summer School, Sveriges Riksbank, IBEFA, CEPR International Monetary History Online Seminar and Erasmus University Rotterdam. We thank Chris Colvin and Lyndon Moore for sharing photos of part of the underlying archival material and part of the data. Kim Osenbrügge provided excellent research assistance. We thank Dick Wijmer for useful discussions and for help identifying archival sources. Any errors are our own. We gratefully acknowledge financial support from the ERC Consolidator Grant #HILL.

Banks are risky and bank failures often have large negative externalities. Due to high leverage and opaque balance sheets, banks are sensitive to agency problems and this can result in excessive risk-taking. Bank executives (henceforth 'bankers'), in particular, face asymmetric payoffs through bonuses and stock-based compensation: they arguably have more exposure to their bank's profits than to its losses. The recent banking turmoil in 2023 at Silicon Valley Bank and Credit Suisse shows that bank risk-taking remains an important concern that has both financial and real implications. To reduce the riskiness of the financial sector, some argue that bankers should be held liable when their bank gets into trouble (Acharya, Mehran and Sundaram, 2016; Goodhart and Lastra, 2020). However, empirical evidence on the effect of additional liability on risk-taking is scarce.

There is evidence from financial history suggesting that bankers with additional liability indeed took less risk (Esty, 1998; Mitchener and Richardson, 2013; Calomiris and Carlson, 2016; Koudijs et al., 2021; Aldunate et al., 2021). In these settings, liability is defined with respect to the banks' losses in case of failure. This is a rather crude way to set incentives. Typically, individual bankers can only affect a limited part of total risk-taking and bank failure may be beyond their direct control. Further, there might be a collective action problem. Depending on the circumstances, this might either make additional liability ineffective, or lead bankers to ban risk-taking from their bank altogether.

A more targeted approach would be to define liability with respect to *specific* losses that can be attributed to bankers' *individual* decisions. Although promising in theory, this may not be effective in practice. Using the opacity of their bank's balance sheet, bankers might be able to hide losses in an attempt to escape this type of liability. Further, if bankers are concerned about their reputation or career, they might avoid risks that can be tied to them personally anyway, instead shifting risk into a gray zone where nobody can be held personally accountable.

In this paper, we ask whether tying bankers' liability directly to their individual decisions can reduce bank risk-taking. Using a newly constructed and unique dataset, we address this in a setting where bankers had additional liability for some of the most material decisions they had to make: the underwriting of security issuances. We analyze this for one of the largest Dutch banks at the time, the *Nederlandsche Handel-Maatschappij* (NHM), between 1919 and 1930. The bank kept uniquely detailed minutes of its activities; secret at the time but accessible to current-day researchers.

The NHM typically formed syndicates with other banks to underwrite the issuance of securities. Bankers had to personally guarantee part of the underwriting if their bank was one of the syndicate leads. At the time, security underwriting was a risky activity with 50% of issues in our sample undersubscribed (40% of issues had a subscription rate of 90% or lower). The bank had to purchase any unsold securities at a loss (see

also Boissevain, 1891; Wertheim, 1891). Bankers received the underwriting fee over all securities they had guaranteed and that were successfully sold to investors. However, if securities remained unsold, the bankers had to purchase these securities personally in proportion to their guarantees. This made the payoff between bank and bankers fully symmetric and exposed bankers to potentially large personal losses.

To examine the effects of this executive compensation scheme on bank risk-taking, we use exogenous discontinuities in the exact bankers' guarantees. These guarantees were set at large round numbers for a given banker. The size of the personal guarantee increased discontinuously, e.g. from 20,000 guilders ($f.$) to $f.$ 40,000 in nominal value (securities were typically issued at par), when the total bank guarantee exceeded a (large) round number, e.g. $f.$ 1,500,000 in nominal value. This generated a step function between the size of the bank and the bankers' guarantee. The exact cutoffs of the step function were pre-determined. We compare the risk characteristics of issues below or above these cutoffs, where we expect issues right above the cut-off to be less risky.

Bank risk is typically hard to measure due to the opacity of bank balance sheets. The great advantage of security underwriting is that outcomes are easy to observe. Further, firm level characteristics are available for public firms while there is fiscal information on the (local) governments for which the bank also underwrote bonds. Our key risk measure is the fraction of the issuance that investors subscribed to. On average, undersubscription *ex post* is indicative of high underwriting risks *ex ante*. We verify this measure by showing that undersubscription is associated with weaker firm balance sheets and worse (local) government finances.

It is not obvious that additional liability directly tied to a banker's personal decision will change behavior. First, personal reputation or career concerns might already limit risk taking. A bank's reputation, especially in security underwriting, is key for future business and can easily be ruined if the bank's decisions are seen to hurt their clients' interests (Fang, 2005; Kymmell, 1998; De Jong et al., 2022; Indarte, 2021). The same could hold for individual bankers if particular outcomes can be directly linked to their personal decisions. Even nowadays, executives claim to be more motivated by reputation than by pay (Edmans et al., 2023). At the same time, the evidence for adverse career consequences from misconduct in finance is limited (Griffin, Kruger & Maturana 2019; Egan, Matvos & Seru 2019). Second, bankers' individual risk aversion might already limit risk taking. For example, the security issues in our setting were seen as risky, with only 50% in our sample being fully subscribed. Even the most experienced bankers could never be confident about the outcome (Boissevain, 1891). Risk-averse bankers may have already tried to avoid risky issues to minimize uncertainty around their bonus payments. Finally, reputational concerns or risk aversion might be dominated by private benefits.

For example, bankers could have interlocking directorates or personal relationships with the executives of the issuing firms that they want to maintain by underwriting the firm's securities.

We implement our analysis with an intent-to-treat two stage least squares (2SLS) design. We focus on issues where the NHM was one of the lead underwriters. We instrument for actual banker guarantees with the predetermined step function. The first stage is strong with an F-statistic higher than 50. Using bin fixed effects, we compare issues above or below a discontinuity. Results are robust to including a host of controls, including whether a banker was also on the board of the issuing firm.

We find that bankers' underwriting guarantees substantially improve the quality of the securities that are selected by the bank for underwriting. This effect is statistically and economically significant. The average banker guarantee was equivalent to approximately $f.$ 20,000 in par value, with a range spanning from $f.$ 2,000 to $f.$ 100,000. In comparison, base salaries ranged from $f.$ 10,000 to $f.$ 35,000. At the discontinuities, banker guarantees increased by about $f.$ 6,000 on average. Our estimates show that this led to an increase in the subscription rate of about 16.8%. Compared to the median subscription rate of 100%, this effect is substantial.

Higher subscription rates for issuances with larger banker guarantees can arise for two non-mutually exclusive reasons: (1) bankers select issuances with less downside risk, or (2) they exert greater effort in placing securities. Our results are consistent with the first mechanism. Restricting our analysis to firms only, we find that bankers' guarantees pushed the bank towards underwriting securities for older firms with lower leverage, more reserves and higher profitability, although these effects are not statistically significant. Further, abnormal returns on securities after issuance were significantly higher with larger banker guarantees.

Results appear to be driven by the decision whether to underwrite a given security issuance and for what amount. When we restrict the analysis to issuances where the NHM was the first lead (first named) of the underwriting syndicate, and likely had more influence over the issuance size and underwriting amounts, we find stronger results. On average, crossing a discontinuity led to a 28.7% higher subscription rate; almost twice the size as for our full sample. This suggests that bankers, whenever possible, actively tried to limit the underwriting amount for worse issuances, only accepting higher amounts if the probability of success was sufficiently high.

It is unlikely that our results are driven by signaling: banker guarantees were unobserved by the public and unverifiable ex post. The reason we are able to observe information about the the size (and existence) of guarantees is because the bank's historical secret minutes have been made publicly available for current day researchers.

Related Literature

This paper makes several contributions to the literature. First of all, we contribute to the literature on the effect of additional liability on bank risk-taking. Esty (1998), Grossman (2001), Mitchener and Richardson (2013), Calomiris and Carlson (2016) and Aldunate et al. (2021) find that additional liability for US banks before the Great Depression reduced risk-taking. For the UK, Grossman and Imai (2013) find that contingent liability in the form of uncalled capital led to less bank risk-taking, while Turner (2014) shows that banks with unlimited liability were less likely to fail. Colvin (2018) examines the choice of liability arrangement in Dutch banks catering to small and medium sized businesses in the 1920s and finds that this mattered little for bank failure. Most closely related is Koudijs et al. (2021) who focus on the personal liability of bank executives. Bankers in New England in the nineteenth century that married under a regime that protected their wife's wealth were more likely to take on more risk and consequently lost more capital and deposits during the Long Depression (1873-1878). We contribute to this literature by analyzing a form of banker' liability directly tied to individual decision making. Bankers might not be able to influence all bank risk management directly. For instance, they might only have indirect control over deposit taking and the performance of the bank's entire loan portfolio, which are important determinants of a bank's overall profitability. In contrast, security underwriting is directly under their control. Not only does this allow us to directly link additional liability to actual decision making, it is also a test of whether targeted additional liability is effective.

Second, our paper is related to literature on executive compensation in banking. Modern-day bankers' "skin-in-the-game" is in the form of equity compensation, which predominantly affects the upside of risk-taking due to the high leverage of banks (Bolton, Mehran and Shapiro, 2015). Empirically, higher equity stakes for bankers appear to increase bank risk (Fahlenbrach and Stulz, 2011; Berger, Imbierowicz and Rauch, 2016). At the same time, inside debt, e.g. future pensions, appears to reduce risk-taking for both firms (Wei and Yermack, 2011) and banks (Van Bekkum, 2016). We contribute to this literature by looking at the direct effects on risk taking of exposing bankers to downside risk.

Finally, our paper fits into the broader literature of managerial incentives and executive compensation. Edmans, Gabaix and Jenter (2017) provide an overview of theoretical and empirical work on executive compensation and argue that the causal effect of executive pay is difficult to identify empirically, due to the endogeneity of compensation contracts. We contribute to this literature by exploiting a predetermined arbitrary rule in compensation contracts that bankers followed when underwriting security issues.

The rest of the paper is structured as follows. Section 1 discusses the relevant historical background. Section 2 describes our newly constructed dataset. Section 3 details our empirical approach, while Section 4 presents our empirical results. Section 5 concludes.

1 Historical background

1.1 General background

During the late 19^{th} and early 20^{th} century, the financial sector in the Netherlands consolidated and large banks adopted a universal banking model. The "Big Five" banks, including the NHM, dominated the banking industry (De Jong and Roell, 2005), even though many specialized smaller banks still co-existed.[1]

The Netherlands remained neutral during the First World War and domestic businesses benefited substantially from exporting to foreign markets, where supply chains were disrupted (Van der Werf, 2014). Firms required ever more capital and the universal banks were quick to provide the funds by either extending private credit or facilitating public issuance of securities. As in neighboring countries, issuing securities via underwriters was a standard practice for firms to attract large amounts of funding through the placement of securities (Boissevain, 1891). A wide range of securities from private firms and public entities, both domestic and foreign, were issued and traded on the Amsterdam Stock Exchange. Different types of financial institutions were active in the security issuance business: brokers, private banking houses, general commercial banks and universal banks. The security market was free from any financial regulation or government intervention (Brouwer, 1969; Geljon, 2005).

After the First World War, the securities markets experienced a short boom in 1919-1920 before collapsing into a global post-war slump (Colvin, De Jong and Fliers 2015). Many banks failed due to the unprecedented credit boom from 1915-1920 and the consequent debt-deflationary period in the early 1920s as their debtors were unable to repay their debts (Jonker, 1991; Colvin, De Jong and Fliers 2015; Jonker and Van Zanden, 1995). The resulting banking crisis between 1921 and 1924 led to the write-off of nearly 10% of the Big Five banks' assets (De Jong and Roell, 2005).[2] The crisis affected especially

[1] The other large banks are Amsterdamsche Bank, Incasso-Bank, Rotterdamsche Bankvereeniging, and Twentsche Bank. Twentsche Bank merged with NHM in 1964 to become Algemene Bank Nederland, while Amsterdamshe Bank and Rotterdamsche Bankvereeniging merged as AMRO in the same year. These two merged banks united in 1991 to form ABN AMRO. For an overview of the Dutch banking system in the early twentieth century, see Colvin, De Jong and Fliers (2015).

[2] The exact start and end dates of the 1920s banking crisis are subject to debate. Some use only 1921 and 1922 as crisis years (Van Zanden, 1997; Benanke and James, 1991). Gelderblom et al. (2023) mentions 1922 as starting year, while De Jong and Röell (2005) and Jonker (1991) see 1920 as the starting

younger, smaller, less diversified and more leveraged banks, but even one of the Big Five universal banks, Rotterdamsche Bankvereeniging, was on the brink of collapse and had to be bailed out.[3]

The economy and the stock market recovered in 1925, and a stock market boom followed. Industrial firms expanded their foreign operations, while Dutch banks increasingly underwrote foreign securities for both public and private issuers (Van der Werf, 2014). This upward trend persisted until 1930, when the Netherlands began to feel the impact of the Great Depression.

1.2 The Nederlandsche Handel-Maatschappij and Underwriting in the Dutch 1920s

The bank that we focus on in our analysis is the 'Nederlandsche Handel-Maatschappij' (Dutch Trading Society, NHM, the bank). The bank was one of the largest and most prestigious banks in the Netherlands in the early twentieth century. The bank was founded in 1824 as a limited liability colonial bank, engaging in financial and trading activities in the Dutch East Indies. Since its establishment the bank was renowned for its solid reputation (Wijtvliet, 1993).[4] Since the 1880s, the NHM shifted from a trading business towards universal banking activities, including securities underwriting.

The underwriting business was considered risky, and the bank's change of course to engage in investment banking in the 1880s was subject to intense discussion between the bankers and the supervisory board (De Graaf, 2012). In 1884, the bank adjusted its articles of association to allow for securities trading on its own account, which was a necessary legal requirement for the bank to be active in security underwriting. The bank created a provision balance sheet item as a buffer for potential losses from underwriting in 1888 and used this reserve already in 1889 (De Graaf, 2012).

We study the security underwriting activities of the NHM from 1919 until 1930. The 1920s were a particularly booming period for security issuance in the Netherlands. Universal

point, even though Jonker (1991) identifies 1922-1924 as the height of the crisis. Colvin (2018) defines 1920-1926 as crisis years. The bailout of one of the Big Five banks occurs in 1924 (Colvin, 2014) and Colvin, de Jong and Fliers (2015) show that recovery began in 1924 for stock prices of banks that did not experience distress, and in 1926 for distressed banks. We define the banking crisis to span the years 1921-1924. This decision is based on the number of security issues during those years: in October 1920 the number of issues starts declining (Van der Werf, 2014) and only in 1925 recovery sets in.

[3]See Colvin (2014) for a description of the crisis and the near-collapse of the Rotterdamsche Bankvereeniging.

[4]The bank fulfilled a unique position in the Dutch society, as it had a special relationship with the government and the royal family and was not only a trading company, but also a commercial and investment bank. The colonial activities were very profitable, especially in the nineteenth century, and remained a substantial share of the bank's business in the first half of the twentieth century. See De Graaf (2012) for an elaborate overview of the bank's colonial business.

banks were especially active, party due to their large enough size to absorb potential losses from underwriting (Van Der Werf, 1990). The NHM was one of the largest players in the underwriting business. Before the First World War, the bank was responsible for more than half of the total syndicates and security issuances in the Netherlands (Kymmell, 1998). Three other large universal banks played an important role in the securities markets in this period as well (Amsterdamsche Bank, Rotterdamsche Bankvereeniging and Twentsche Bank). Other smaller commercial banks and prestigious investment banks ('bankiershuizen') such as Hope & Co. and Van Eeghen & Co. were active as well, often forming an underwriting syndicate with a universal bank.

Security issues were fixed price offerings that the public could subscribe to. Securities were mostly issued around par (see Figure A1). Underpricing was limited, unrelated to the volume of the security issuance, but correlated mainly with stock market sentiment (Legierse, 2023). In the event of oversubscription, the securities would be divided pro rata among the subscribing investors. The demand for newly issued securities in the 1920s stemmed from different groups of investors, depending on the type of issuer. Institutional investors mainly invested their money in Dutch and Dutch East Indies government bonds (Legierse, 2023). The upper class elite of private capital owners dominated the share purchases of industrial firms (Westerhuis and de Jong, 2015). Since the standard nominal value of a security was $f.$ 1,000, few small private investors had pockets deep enough to participate.[5]

We focus on the most common type of underwriting whereby the underwriter would agree to guarantee the placement of securities for a specific price (full commitment). This way, any placement risk was shifted from the firm to the bank. The underwriter then tried to sell the securities on the predetermined issuance date. If there was not enough investor demand, the underwriter was obliged to buy the securities at the pre-specified price, which it would try to sell in the future. When an issuance was successful, the underwriter received a commission premium, which was often a few percentage points of the total issuance amount (on average 3% in our sample). Underwriting was considered successful when subscription on the issuance day was close to the full amount of securities offered. We consider every issuance above 90% subscribed as successful. When the issuance failed, the underwriter was exposed to substantial losses, up to the total underwriting guarantee. The bank could potentially sell the securities for a good price at a later stage, but this was uncertain ex ante and selling later often resulted in losses (Geljon, 2005; Kymmell, 1998). In many cases, unsold underwritten securities remained on the bank's balance

[5] A thousands guilders in the 1920s is equivalent of €15,000-20,000 nowadays, depending on the year in which the security was issued. Source: Central Bureau for Statistics, https://www.cbs.nl/nl-nl/visualisaties/prijzen-toen-en-nu

sheet.[6] For instance, a substantial amount of Chinese government bonds ($f.$ 3,9 million) issued in 1922 were still on the balance sheet of the NHM in 1934 (De Graaf, 2012).

Financial intermediaries often set up a syndicate ("consortium") to share the underwriting risk. Wertheim (1891) defines a syndicate as a temporary collaboration between banks or other financial intermediaries to sell securities to the public. At the end of the syndicate agreement, remaining unsold securities had to be divided among the participants in the syndicate, proportional to their initial underwriting guarantee. The NHM had several underwriting partners with whom it regularly formed syndicates, depending on the type of issuance that was offered.[7] Each member of the syndicate could subsequently offer a sub-participation to other 'friendly relations', such as banks, firms or their executives.[8]

Underwriting offers can be divided into two categories: offers where a bank was one of the the lead underwriters, and offers where the bank was a syndicate participant. If the bank was a lead underwriter, it received an underwriting offer from a public or private issuing entity that wanted to raise a certain quantity in the market. The bank—together with any other lead underwriters—would negotiate the and issuance price and quantity. Since most securities were issued at par and the pricing of securities is uncorrelated with the success of the issuance, negotiations were most likely focused on the issuance amount. If the amount requested by the firm was deemed too large for the leads to underwrite on their own, they could invite other banks to participate. The NHM's guarantee was substantially higher when it was a lead underwriter (see Figure 1). Also, after a failed issuance, its reputational damage would be larger; the prospectus, offered to the public, only included the names of the lead underwriters, not of the participants (Wertheim, 1891).

If the bank was a participant, it could only accept or reject the offer from a lead underwriter who would have first negotiated the terms with the issuer. It was unable to check the issuer's books before issuance. Accepting participations offered by friendly relations was necessary to "prevent isolation on the stock market and consequently be excluded from doing business."[9] Figure A2 shows that on average, issues where the bank was a participant rather than a lead underwriter were slightly less successful.

Investors could subscribe to the issuance through the offices of the bank in the big cities or of smaller affiliated banks in the provinces. As is typical today, allocation was pro rata and we see many instances where investors subscribed for extraordinarily large amounts

[6] End of year reports from the executive board to the supervisory board included lists of unsold securities still held by the bank. NL-HaNA, NHM, 54: yearly report 1930.

[7] Amsterdam municipal bonds were underwritten together with Hope & Co. and the Amsterdamsche Bank, while for foreign issues the bank often collaborated with the German Mendelssohn & Co.

[8] NL-HaNA, NHM, 72, 1907 p. 47-48.

[9] NL-HaNA, NHM, 36: 12-11-1907 - 14-11-1907, authors' translation.

("majoreren") because they knew the issuance would be oversubscribed, leading to subscription rates of sometimes 40 times the issuance amount.

1.3 Bank management

The NHM had five to six executives ("bankers"): the president, three or four directors and a secretary. Three bankers, president Van Aalst, director Bierens de Haan and secretary Abbing, remain in the same role throughout our period of analysis. The composition and number of director changed over time: 3 in 1924 and 1930 and 4 in the years 1919-1923 and 1925-1929. All bankers were selected based on their expertise and experience (De Graaf, 2012). The president had the decisive vote in meetings. The bankers were overseen by a Supervisory board.[10]

The bankers received a fixed base salary depending on their position. The president received a $f.$ 20,000 fixed salary in 1919; the directors were paid 80% and the secretary 40% of the president's salary. These fixed salaries were low compared to other banks (De Graaf, 2012). They were increased once in our sample period, by 75% in 1925, when the economy recovered from the banking crisis.

Additionally, the bankers received a bonus ("tantième"), which was a percentage of the bank's profit ranging between 1-2.5% based on the same ratios as the fixed base salary. Figure 2 shows the evolution of the base salaries and tantièmes over the years of our sample. At its peak in 1919, the tantièmes were almost 14 times higher than the base salary. However, the tantièmes fluctuated significantly over time. During the banking crisis of 1921-1924 the bankers' bonuses declined substantially to amounts that were comparable to their base salary.

Finally, bankers often held supervisory board positions at firms the bank worked with to oversee affairs there. This often generated additional income.

1.4 Personal guarantees in underwriting

The bank's supervisory board was in continuous debate with its bankers about the latter's income. The board was reluctant to increase fixed salaries, as this would decrease the

[10]The supervisory board represented the bank shareholders and had to consist of at least ten members chosen from the electoral committee of the local Chamber of Commerce. The supervisory board members received a small attendance fee and a share of the bank's annual profits (2.5% to be divided among all members, usually around 15 directors). They met as often as was seen fit to audit the bankers. They had the power to accept or reject the balance sheet (including the amount of dividend to be paid out) and the yearly reports of the directors.

bank's profits, especially in meager years.[11] The bankers often complained about the low level of fixed pay.[12]

The supervisory board was also cautious about using tantièmes in fear of excessive risk taking. As one supervisory board member indicated:

> "To view tantièmes in the bank's profit as an incentive for better management is a folly. NHM's bankers are always persons that do not require such an incentive. However, even for an institution as ours, with such substantial capital, there still exists the possibility, that such an incentive could work counterproductive, and could lead to large, even risky speculations, in which the bankers would share the profits, but not the losses."[13]

Upon his appointment as President in 1913, Van Aalst pushed for another structural form of payouts: personal guarantees in security underwriting. Bankers would guarantee a fixed amount of the issuance over which they would receive the underwriting fee. If the issuance failed, they had to personally purchase a fraction of the unsold securities in proportion to their guarantees. That is, if half the issuance remained unsold and they had guaranteed the placement of 50 shares, they had to personally purchase 25. Market prices for failed issuances were typically (far) below the issuance price and this exposed the bankers to potentially large losses.

The use of personal guarantees in security underwriting was well-known among Dutch limited liability banks (Boissevain, 1891). NHM had used them with some frequency before 1913 as a way to underwrite larger amounts that the bank would otherwise have been comfortable with.[14]

Van Aalst, who was a powerful figure within the bank (De Graaf, 2012)[15], made these personal guarantees a standard element of the bank's underwriting. It seems that this was a way to increase the bankers' pay that was acceptable to the supervisory board. Personal guarantees did not reduce the banks' profits in a way fixed salary payments

[11] NL-HaNA, NHM, 37: 7-5-1937.

[12] For example, comments were raised about the "improper ratio between salary and tantième against which [Secretary Abbing] and the bankers appointed after him repeatedly voice their objections." NL-HaNA, NHM, 4129: 24-1938, authors' translation.

[13] NL-HaNA, NHM, 33: 21-11-1879, authors' translation.

[14] For example, in early 1911, bankers provided guarantees in the issuance of a 4% bond of a colonial company because "it was not deemed desirable that the NHM would participate for more than $f.$ 100,000 in the syndicate." Two weeks later, they also provided guarantees in an IPO of a newly established company since "the exposure for the bank would have been too high otherwise". NL-HaNA, NHM, 437: 30-01-1911, 10-02-1911, authors' translation

[15] According to banker Ernst Heldring, who would become president of the bank in 1939, Van Aalst had great power within the bank and the Netherlands, and only surrounded himself by followers and rather dependent businessmen. See Ernst Heldring (1970), *Herinneringen en dagboek*, e.g. p. 480, 530, 556, 623.

would; at least in theory, larger underwriting amounts guaranteed by the bankers did not reduce the bank's profits. At the same time, the downside exposure inherent in the personal guarantees did not incentivize excessive risk taking the way tantièmes might. By the 1920s, personal guarantees in underwriting had become common practice among other Dutch limited liability banks as well (Van der Werf, 2014; De Graaf, 2012).

Guarantees were assigned to all bankers, regardless of their attendance at the meeting deciding on a specific security issuance. It was clear to everyone involved that these personal guarantees exposed the bankers to substantial downside risk. According to Boissevain (1891), even the most experienced and skilled banker could not be certain of the success of a security issuance. The guarantees were substantial compared to the bankers fixed annual salary. The median (average) personal guarantee per issuance during our period of analysis was $f.$ 17,500 (26,000) for the president, $f.$ 14,000 (20,000) for each director and $f.$ 10,000 (14,000) for the secretary. One average underwriting guarantee was comparable to the entire annual fixed salary. Some in the supervisory board considered the personal guarantees "not so much as a source of profit, but primarily as a risk".[16] One of the NHM's bankers, Secretary Abbing, suffered substantial losses from personal guarantees provided in the 1920s resulting in a debt to the bank of $f.$ 60,000.[17]

After Van Aalst resigned as President in 1934, the use of personal guarantees virtually disappeared. It appears that Van Aalst had been relatively risk-tolerant and willing to face substantial risk to earn additional income. The system had started to break down after the onset of the Great Depression. By 1931, only 6 of 24 underwriting instances were personally guaranteed by bankers (down from 30 of 49 in 1930). After Van Aalst's resignation, there was renewed debate in the supervisory board about the costs and benefits of the personal guarantees. There was a proposal to deposit the fees from personal underwriting into an escrow account to cover future losses (to avoid situations like Abbing's).[18] In the end, the system was abolished in 1937 at the same time that bankers' fixed salaries were increased.[19]

The details about the bankers' personal guarantees were kept secret from the public. We only observe the size of the bankers' guarantees because the bank's secret minutes have been made available to the public. The prospectus of each security issuance contained only information on the banks that were involved as underwriters (without revealing the exact exposure each bank had). Even if bankers revealed their exposure to others *ex*

[16]The meeting minutes initially spoke of "sacrifice" rather than "risk". NL-HaNA, NHM, 37: 27-11-1936

[17]NL-HaNA, NHM, 4129; 37: 24-11-1937.

[18]"Bankers should only be allowed to participate in syndicates if they would form a 'consortium' between themselves that should include paid-in capital, yearly balance sheets and profit and loss statements and which could pay out dividends to the bankers, only after securing sufficient reserves". NL-HaNA, NHM, 37: 29-05-1934, authors' translation.

[19]NL-HaNA, NHM, 37: 27-11-1936.

ante, the signal was not verifiable *ex post*. The secret minutes were only made available gradually to researchers between 1967 and 2010. It therefore seems unlikely that bankers could influence the outcome of the security issuance by signaling their exact guarantees to investors.

2 Data description

2.1 Sources and data construction

We hand-collect data from the archival records of the NHM. The bank is the only large Dutch banks with nearly complete detailed records available at the Dutch National Archives. Decisions regarding bank underwriting amounts and personal banker guarantees are documented in detail in minutes of confidential executive meetings ("secret minutes"), annual reports and security books. We hand-collect this data for all underwriting decisions from 1919 to 1930. We start in 1919, right after WWI when the number of issuances on the Dutch stock market grew substantially. We exclude the period after 1930 due to the lower number of underwriting opportunities and personal guarantees.

We have information on the size bank's underwriting position, the underwriting fee, security and issuer characteristics, the currency of the issuance, other syndicate members, sub-participants, (supervisory) board positions of the bankers at the issuer and previous lending relations and the subscription rate of investors. We analyze the data in the original currency, to keep round numbers of both the bank's underwriting position and the bankers' guarantees. We only scale Austrian Kronas (multiplied by 0.001) and British Pounds (multiplied by 10) to approximate their Dutch guilders value and avoid outliers. We rely on De Graaf (2012) and issuance prospectuses for the bankers' directorates at the issuing firms and for information on previous interactions with issuers.

Second, we retrieve additional data on the issuers' underlying fundamentals from Van Oss' yearbooks and prospectuses over the same period 1919-1930. We hand-collect company balance sheet data and (local) government financial information. For firms, we hand-collect total debt, equity, assets, capital, age of the firm, profitability, reserves and dividends. We try to resemble as much as possible the information that investors had available at the time of issuance by using balance sheets and prospectuses from the year before the issuance. If this information is not available due to the issuance taking place early in the year, we use information from two years before. We use the balance sheet of the underlying firm if it is part of a holding company (if available). We do not need to convert the firm balance sheet items to guilders, as we only use financial ratios and scale variables by total assets. For public institutions, we collect debt per capita and deficit

(surplus) per capita. We use the exchange rate from prospectuses, or, if not available, the yearly guide to stock market prices ("Gids bij de Prijscourant") to convert the debt and deficit numbers into guilders.

2.2 Predetermined rule for personal guarantees

The size of the banker's personal guarantees depended on the bank's underwriting amount. There was a discontinuous rule where the personal guarantees increased step-by-step at predetermined discontinuities. Figure A4 plots the observations in our main sample where the bank is one of the lead underwriters. The personal guarantees are always a round number. The figure shows that the majority of observations follows a step function (although there are deviations). We show the median guarantee among all directors to deal with cases in which one of the directors had a smaller or larger guarantee. In line with the fixed salaries and tantièmes, the typical guarantees of the president and secretary were 125 and 75%, respectively, of the directors' (see Figure A3 in the Internet Appendix). [20]

The archival documents do not contain any explicit information on the exact rule, yet Figure A4 shows a clear pattern. We infer the exact steps of the rule using several restrictions: First, the steps cannot overlap. Second, the steps should be monotonic: banker guarantees should increase for each step. Third, the range of of the bank's underwriting position should increase with each step. Fourth, board connections should not determine the rule. Board connections can lead to deviations from the rule as bankers might have more private information and/or private benefits. While we control for this in our regression analysis, the observations cannot be relied upon to determine the step function. Fifth, each step should contain at least two observations. Sixth, below $f.$ 150,000 the bankers do not underwrite, simply because the exposure for the bank is too small for personal guarantees. We exclude issuances where the bank's underwriting amount exceeded 5 million: there are too few to back out the rule. Figure A4 shows the resulting rule.

There was a shift in the rule after October 1925, with bankers generally having lower guarantees. The bankers' personal income had substantially declined during the crisis period of 1921-1924, with tantièmes in some years approaching the low base salary (see Figure 2). In 1925, the supervisory board approved an increase in the bankers' fixed base salary. This appears to have gone hand in hand with lower personal guarantees in underwriting such that bankers would have less of their personal wealth at risk.

Bankers did not always adhere to the rule exactly. Deviations occurred more often with domestic securities, especially when the bank had done underwriting for the issuer before

[20] In rare cases where all directors appear to deviate from the rule, we adjust the median director guarantee with 80% of the president's or 133% of the secretary's.

or when one of the bankers had a interlocking directorate. It is possible that deviations from the rule are correlated with issuance success (e.g. bankers guaranteeing more than required for less risky issuances). To remedy this problem, we implement an intent-to-treat design where we instrument the actual bankers' guarantee with the guarantee predicted by the rule.

In our empirical analysis, we compare issuances above and below the rule's discontinuity. In particular, we include bin fixed effects in our regressions. Each bin starts in the middle of a step, and ends in the middle of the next step. Figure 4 has a visual example. We create one bin for observations with an underwriting amounts less than $f.$ 50,000.[21] Using these bins, we can compare observations were the bank had a similar position, keeping issuance size largely constant.

2.3 Summary statistics

The bank is active in underwriting 561 security issues from 1919-1930. We exclude observations where the exact bank underwriting position or the success of the issuance is missing. 318 of the 561 issues are participations, i.e. cases where the bank is not the lead underwriter but a member of the syndicate (64) or a sub-participant (254). Our main analysis contains the remaining 243 security issues where the bank is one of the leaders of the syndicate. Using all the bankers in our sample as individual observations provides us with 1,418 observations. In our sample, 215 securities (1,255 observations) have personal banker guarantees.

Table 1 shows the characteristics of the security issuances NHM underwrote by year. During the banking crisis years of 1922-1924 there were hardly any: 1922 was the least active year with only three issuances. In the years after the banking crisis, the number of issuances increased to a peak of 42 in 1928. The other columns in the table show the yearly percentage of issuances that were stocks or (local) government issues, had foreign issuers, were issued in Dutch guilders, and were successful. From 1919-1920, in the post WWI years, the Amsterdam stock exchange saw a boom in the issuance of domestic stocks. More than 60% of the securities in our sample are stocks, all issued in Dutch guilders. Moreover, 100% of the securities are from domestic issuers in 1919 and 89% in 1920. In the other years of our sample, the majority of the observations are bond issues. Especially after 1924, the share of foreign security issuances dominates, even though a substantial number is still issued in the Dutch guilders. Foreign firms and governments often issued securities in multiple markets, where cross-border syndicates were set up and securities were listed on several exchanges (especially for very large issues). The securities

[21] Excluding this 'zero bin', which contains 23 observations, does not affect the results.

listed on the Amsterdam Stock Exchange were sometimes issued in guilders in those cases. Issuance success varies over time, with a majority of securities fully subscribed in all years but 1922, 1928 and 1929. The increasing number of relatively low quality issues (i.e. not fully subscribed) in 1928 and 1929 is an indication of the overheated stock market.

Table 2 shows the summary statistics for our sample of security issuances underwritten by NHM. The observations are mostly in guilders (59%) and dollars (28%). Realized banker guarantees, around 20,000 in the currency of issuance, are slightly smaller than predicted by the rule, largely because in some cases a banker did not participate in the guarantees. The bank's average share in the underwriting syndicate was 34%. Of all issuances, 59% were successful (had a subscription rate above 90%), with 50% of issuances fully or oversubscribed. The distribution of subscription rates is highly skewed. While the median issuance is fully subscribed, the average is 25 times oversubscribed. This likely driven by the fact that investors would put in extra large subscriptions if they expected the issuance to be oversubscribed. While the costs for the bank associated with under-subscription are linear in the subscription rate, benefits are capped at full subscription. We therefore take the log of the subscription rate, where zero indicates a full subscription, which better reflects the upside and downside of underwriting (see Figure 5 for the distribution).

Only 2% of issuances in our sample are IPOs, with SEOs and bond issuances making up 20% and 77% , respectively. In 17% of cases, the issuer has a borrowing relationship with the bank; in 15% of cases there is an interlocked directorate. These two variables are not collinear: only half of the observations where the issuer has a borrowing relationship with the bank also feature an interlocked directorate.

The other variables in Table 2 come from firm balance sheets and public entity prospectuses, all in year before issuance. This information is not available for the entire regression sample. Issuance/size is the total security issuance divided by the total assets of the firm. On average, firms issued 17% of their size in additional capital or debt; for some this is more than half their size and in the 99th percentile, a firm's size even doubled after the issuance. On average, reserves were 10% of assets, with profits 5%. The average firm in our sample was 25 years old, and had twice as much debt as equity on its balance sheet. Debt makes up nearly half of total assets. Some (local) governments provide information on outstanding debt and budget surplus or deficit in the year before issuance. Outstanding debt is on average $f.$ 228.59 per capita, while budget deficits are$f.$ 0.43 per capita.

Table 3 compares observations within bins where the bank's underwriting amount is just above or below a discontinuity in the rule. By design, the underwriting amount is higher above the discontinuity and this difference is statistically significant. The average actual and predicted personal guarantees are $f.$ 5,700 and $f.$ 7,000 higher. The difference

between the two is due to the deviations from the rule. The dependent variable, the log subscription rate, is also significantly higher and the probability of success increases from 44% to 55%.

Other variables do not significantly differ around the discontinuities. Above the discontinuity, the underwritten securities are slightly more likely to be bonds and issued in guilders. The number of bankers in our sample varies between 5 and 6 depending on the year. Below the discontinuities, the number of bankers participating in underwriting is slightly below 5. This is due to more issuances where the bankers did not participate at all. Again, this difference is not significant.

3 Empirical approach

We examine the relation between personal guarantees and the quality of issuances as proxied by the investors' subscription rate. The step-function led to increases in banker guarantees around predefined discontinuities, but Figure 6 shows that bankers sometimes deviated from this rule. It is possible that these deviations are correlated with the ex ante likelihood of an issuance succeeding. Figure 6 provides suggestive evidence for this: banker guarantees are more likely to exceed the amount determined by the step function for issuances that were successful ex post. To address this concern, we use an intent-to-treat design, instrumenting the actual personal guarantee with the predicted guarantee implied by the step function using 2SLS. This approach isolates the exogenous variation in personal guarantees driven by the step function, allowing us to estimate its effect on the quality of the issuance.

The first stage estimates the relationship between the actual personal guarantee and the instrument, the predicted personal guarantee, as follows:

$$D_i = \beta Z_{i,d} + \Gamma' X_i + \eta_t + \zeta_b + \kappa_d + \tau_g + \epsilon_i \tag{1}$$

In the second stage, we regress the quality of the security issuance i on the instrumented personal guarantee:

$$Y_i = \beta \hat{D}_{i,d} + \Gamma' X_i + \eta_t + \zeta_b + \kappa_d + \tau_g + \tilde{\epsilon}_i \tag{2}$$

For our main regression analysis, the outcome variable Y_i is measured as the logarithm of the subscription rate. The independent variable of interest is the actual or instrumented banker guarantee, $D_{i,d}$ or $\hat{D}_{i,d}$ in thousands of the currency of issuance. The instrument

$Z_{i,d}$ is the predicted banker guarantee in thousands of the issuance currency. X_i is a set of controls: dummies for 1) a stock or bond issuance, 2) a public or private issuer, 3) a foreign or domestic issuance, 4) an interlocked directorate, 5) an IPO and 6) an existing bank borrower relationship. We also control for the share of the bank guarantee in the syndicate. We include fixed effects for year t, banker d, industry g and importantly, bin b. With bin fixed effects, we compare issues above and below a discontinuity. This also prevents bank guarantee size driving the results. With year fixed effects we compare issues within each year to avoid that the post-war boom and banking crisis period affect our results. With industry fixed effects, we control for heterogeneity in security issuances, such as industry-specific risks and capital needs. With banker fixed effects, we control for changes in executive composition. We cluster standard errors by issuance.

We run the same regressions for president Van Aalst, director Bierens de Haan and secretary Abbing individually. These three bankers remained in their function throughout our period of analysis. We include the same control variables as before.

We run separate regressions for our sample of firm issuances, where look at the log issuance rate and a number of alternative dependent variables that capture some dimension of issuance quality or risk: the logarithm of the age of the company at the moment of issuance and debt, reserves or profits over total assets, all in the year before the issuance. We use the same control variables as in our main specification.

4 Results

4.1 Issuance subscription

Table 4 shows that issuances with higher banker personal guarantees were substantially more successful. Column 1 to 4 include all observations where the bank is one of the lead underwriters. Column 5 includes only observations where the bank is the first lead of the syndicate. The top panel displays the OLS results. Personal guarantees are associated with higher subscription rates and therefore higher quality issues. Column 1 shows that an additional 1,000 (guilders, dollars, etc.) of personal guarantee, within each bin and year, is associated with a 2.7% higher subscription rate. The results are almost identical when we include industry fixed effects (column 2) and the coefficients increase slightly when we add banker fixed effects (column 3). When including all fixed effects and controlling for the characteristics of the issuance, which is our most conservative estimate (column 4), the coefficient increases to 3.2%.

The OLS results might be driven by cases where the bankers deviate from the rule for higher quality issues. We therefore instrument the actual banker guarantees with the predicted guarantees according to the step function. The reduced form results in the second panel confirm that subscription rates are higher when step function stipulates higher personal guarantees. The coefficients in column 1 - 4 remain significant but are slightly lower than in the OLS, ranging between 1.5% and 2.1%.

The first stage estimates in the bottom panel confirm the relevance and strength of the instrument; it is highly significant and stable in all four columns with a coefficient of around 0.8. The Kleibergen-Paap F-statistic is above 50 in all four columns.

The second stage IV results in the third panel are statistically significant and in line with the OLS estimates. An additional 1,000 in instrumented personal guarantees is associated with a higher subscription rate of 2.6% in our most conservative estimate (column 4). This is somewhat lower than the OLS, suggesting that when bankers deviated from the rule, this was at least in part driven by their ex ante expectations of the issuance's success. The average (median) increase in personal guarantees at a discontinuity is 6,000 (3,000). Our estimates suggest this led to an increase in the subscription rate of about 16.8% (8.1%). Compared to the median subscription rate of 100%, this effect is substantial.

Even though the discontinuities at which personal guarantees increased were predetermined, the eventual size of the issuance was not. One interpretation of our results is therefore that bankers only increased their own and the bank's exposure for higher quality issuances. We explore this further in Column 5 of Table 4 where we only consider cases where the NHM was the first lead (first named) of the underwriting syndicate and likely had more influence over issuance size.[22] The bank is the first lead in 70% of our observations. The OLS results are similar to the full sample, but the coefficients of the reduced form and IV estimates (both significant at 1%) are substantially larger than the full sample results. When the bank is the first lead, an additional 1,000 of personal guarantees leads to bankers underwriting securities that have an approximate 4.2% higher subscription rate. With an average increase at a discontinuity of 6,000, this led to a 28.7% higher subscription rate; almost twice the size as for our full sample. The personal guarantees were thus especially effective when the bank had more influence over the eventual size of the issuance.

Table 5 replicates the same analysis for the three individual bankers that were present throughout our sample period. The upside of this alternative approach is that we no longer need to cluster our standard errors. The downside is that we have less statistical power in the first stage: individual deviations from the rule become quantitatively more important compared to our baseline where we consider all bankers together and

[22]NL-HaNA, NHM, 5956.

idiosyncratic deviations largely cancel out. The results in Table 5 are similar to the full sample analysis and even increase in magnitude for the director and secretary in the OLS. The first stage remains statistically significant, but, as expected, the F-statistics are substantially lower between 12 and 16. The IV coefficient estimates are comparable to our baseline, but, due to lower statistical power, only statistically significant at the 10% level. We therefore prefer our baseline estimates where we pool all bankers together.

4.2 Mechanism

Higher subscription rates for issuances with larger bank director guarantees can arise for two non-mutually exclusive reasons: (1) directors select issuances with less downside, or (2) they exert greater effort in placing securities. In this subsection, we provide evidence consistent with the first mechanism by demonstrating that issuances with larger director guarantees exhibit stronger fundamentals and generate higher subsequent returns.

4.2.1 Ex ante riskiness

First, we compare the security issuances' ex ante quality and riskiness. For the subset of firms, we consider the age of the firm, with older firms likely having safer issuances because of the better information availability for investors (e.g. Legierse 2023). Further, we consider leverage, the reserve ratio and profitability. Focusing on firms shrinks our sample to 847 observations.

We compare the distribution of ex ante risk measures between successful and unsuccessful issuances. Figure 7 shows the kernel densities. Firms with successful issues are relatively older and have less leverage, more reserves and higher profits on average.

We analyze other risk measures for public institutions, for which we have 325 observations. The best available measures for our sample are debt and fiscal deficits per capita (both in the year of issuance). Figure 8 shows the distributions by success of the issuance. Public debt and deficits are slightly higher for unsuccessful issues, The differences are minimal, however, which might be due to the smaller sample size and heterogeneity in the tax authority of the different public entities.

Table 6 compares the firms for which we have complete financial information. It shows the average firm balance sheet variables within bins for issuances above and below the discontinuities. Again, the bank's underwriting position and the bankers' personal guarantees (both actual and predicted) are significantly higher above the discontinuity. The likelihood of a successful issuance increases from 38% to 56% when crossing a discontinuity. This difference is nearly twice as large than in our full sample. Observations above

the discontinuity consist of 59% foreign firms, compared to 49% below. This difference is statistically significant and we control for it with a foreign issuance dummy in the regression analysis. Balance sheet items are not significantly different, though reserves are higher and leverage is lower above the discontinuity.

Table 7 implements our main regression analysis. Column 1 considers the log subscription rate. The coefficients in the OLS, RF and IV specifications and the F-statistic in the first stage are all larger than for the main sample. For this subsample, the average increase in the bankers' guarantees at a discontinuity was 7,000. According to our point estimates, this was associated with an increase in the subscription rate of about 31% in the IV.

Columns 2 through to 5 shows that higher personal guarantees are associated with older firms, lower leverage, higher reserves and higher profits. Effects, though, are small and statistically insignificant, likely because of limited sample size and the multiple (uncorrelated) dimensions of risk. An increase in 7,000 of the banker guarantee is associated with firms that are 5% older, have 0.71 percentage points less debt, 1.09 percentage points higher reserves and 0.29 percentage points higher profits over total assets.

4.2.2 Returns

Next, we compare ex-post security returns for issuances above and below an underwriting discontinuity. Results are in Table 8. We examine abnormal returns immediately following issuance (0m) and over the subsequent one (1m) or two months (2m) . The first three columns include bin and year fixed effects, the next three add industry fixed effects, and the final three incorporate additional controls. The results indicate that securities with underwriting guarantees above the threshold had higher abnormal returns, particularly over a two-month horizon . The economic magnitudes are substantial: after two months, securities with larger banker guarantees exhibit abnormal returns that are 3.5 to 4 percentage points higher on average. These effects are statistically significant when we exclude industry fixed effects or include additional controls. Overall, these findings support the hypothesis that larger banker guarantees improve security quality.

4.3 Robustness

We infer the step-based rule from the realized data, with a non-negligible number of deviations. It is possible that the actual data generating process does not follow such a rule and that we over-interpret the empirical patterns. We perform a simulation exercise to see how often we would expect a random data generating process (with round numbers)

to generate a step-function that has a goodness-of-fit that is similar or better than the one that we identify in the actual data.

In particular, we create 10,000 counterfactual banker guarantees for the median banker, without imposing any rule. The counterfactual banker guarantees are derived randomly from the error term of the bank guarantee. We take into account the non-normal distribution of the errors from a linear regression of banker guarantees on bank guarantees and impose this distribution on our counterfactual datasets. We obtain 10,000 counterfactual datasets for which we cluster the bank and banker guarantees based on the number of bins used in our dataset, i.e. 8 for 1919-1925 and 12 for 1925-1930. These clusters in our counterfactual datasets form the counterfactual step functions. We cluster using 3 approached: 1) without any restrictions, 2) with imposing monotonicity of the rule and 3) with monotonicity of the rule and increasing bin size. We compute the mean squared error (MSE) of each counterfactual dataset and compare these with our own MSEs of both step functions. Figure 9 shows that our step functions for both periods are not random. For the first(second) period, it outperforms the counterfactual step function 97% (95%) of the time.[23] See appendix A2 for more details on the computation of counterfactual step function.

5 Conclusion

This paper analyzes the effect of bankers' personal guarantees on bank risk-taking. We exploit uniquely detailed data from a large and prestigious Dutch universal bank in the 1920s in which bankers had to provide personal guarantees for their bank's underwriting activities. Underwriting was risky at the time, with 50% of issues under-subscribed. Bankers chose whether and how much the bank would underwrite and directly influenced how much risk the bank took on. They faced additional liability as they had to personally guarantee a pre-determined part of the issuance. This guarantee followed on a step function in the bank's underwriting amount: at pre-specified discontinuities, the guarantees increased by a discrete amount. We use the subscription rate as an ex post measure of issuance quality and risk and show that it is correlated with with ex ante measures, such as firm age, leverage, reserves and profitability.

Issuances right above a discontinuity, for which bankers had to provide larger guarantees, had substantially higher subscription rates. The effect is strongest for underwriting syn-

[23]Since imposing monotonicity and increasing bins constraints lowers the chance of obtaining an actual step function, we allow 2 attempts for approach 1), 20 attempts for 2) and 200 attempts for 3). If within these attempts a counterfactual step function cannot be found, we consider the MSE of that dataset to be higher than our own step function.

dicates where the bank was the first lead and likely had more influence over the issuance amount.

Our results suggest that additional liability, directly tied to bankers personals decisions, can be a valuable tool in decreasing bank risk-taking.

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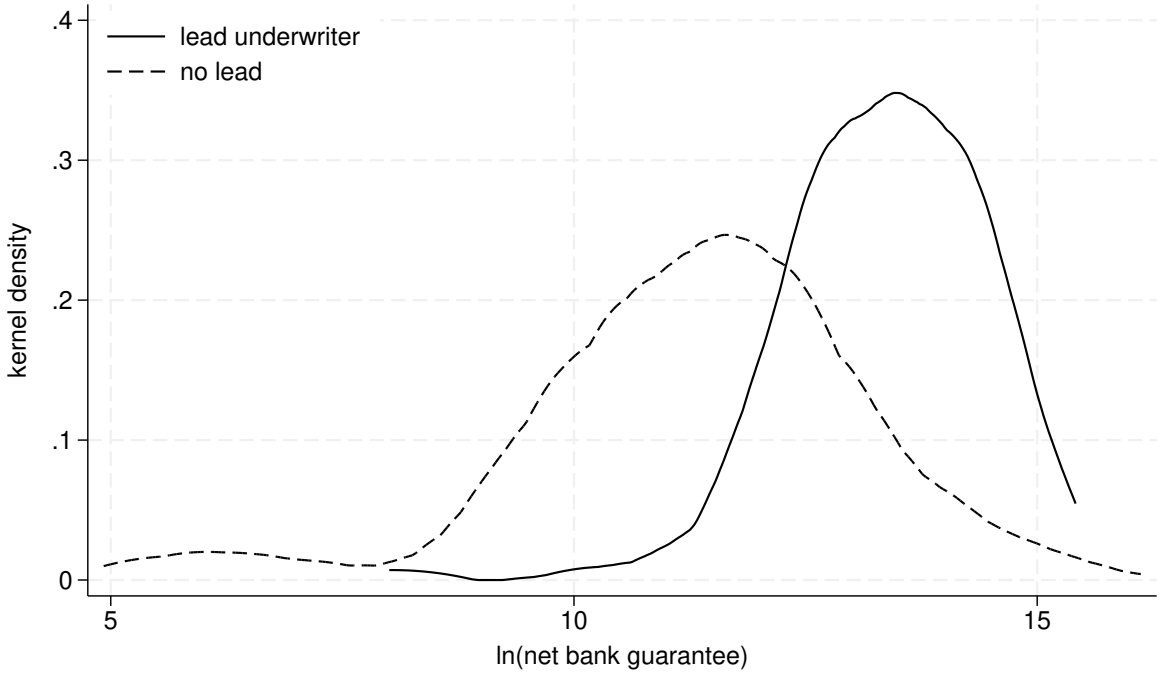
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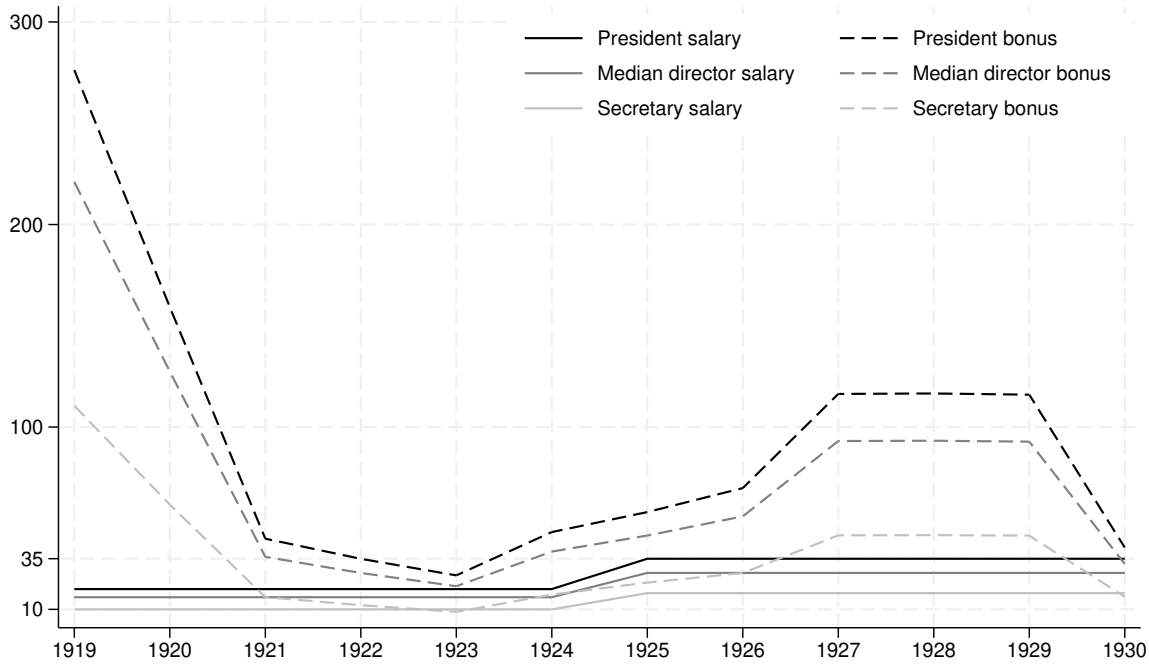
Figures

Figure 1: Distribution of bank's guarantee, by lead underwriter



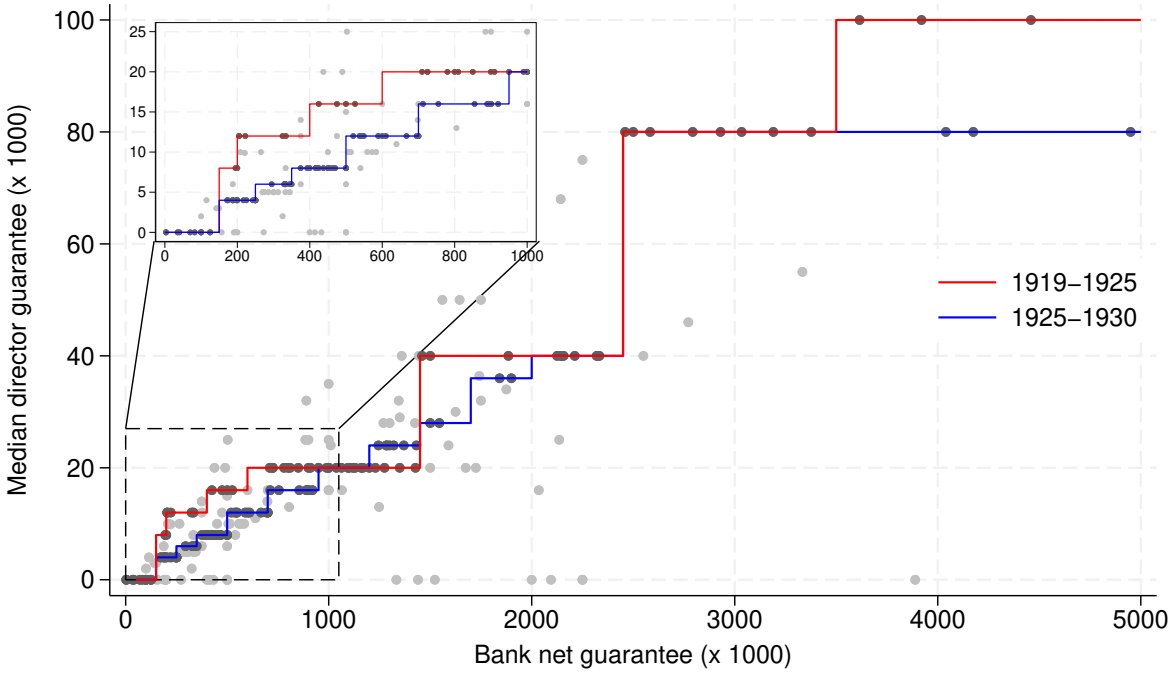
Note: This figure shows the kernel density of the natural logarithm of bank's guarantee in security issues. The solid line reflects the observations where the bank is one of the lead underwriters, while the dashed line represents the observations for which the bank is a participant in the syndicate. The densities include all observations below 5 million net bank's guarantee in the currency of issuance.

Figure 2: Banker compensation 1919-1930



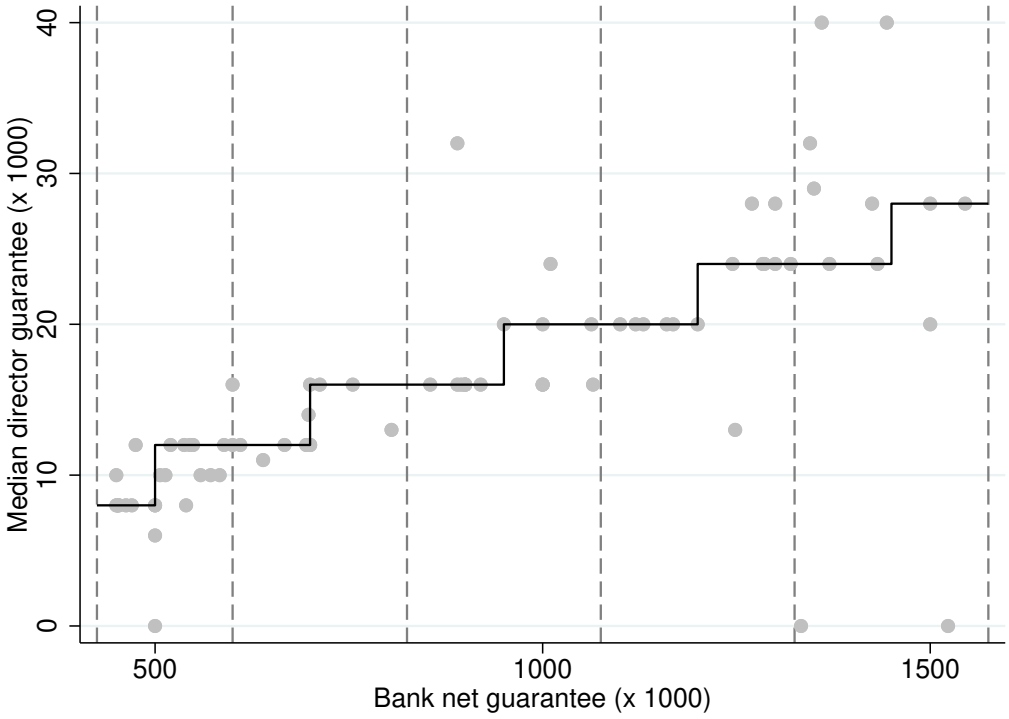
Note: This figure displays the annual salaries (solid lines) and tantièmes (dashed lines) for the president (black), median director (mid grey) and secretary (light grey). The base salaries range from $f.10.000$ to $f.35.000$ guilders in our sample period. The annual salary for the president is $f.20.000$ from 1919-1924, $f.35.000$ thereafter. For the directors, $f.16.000$ from 1919-1924, $f.$ 28.000 thereafter. For the secretary: $f.10.000$ from 1919-1924, $f.18.000$ thereafter. Directors enter and exit throughout the years, leading to pro rata salaries. The figure shows the 'median' director to display the compensation over a full year of a bank director. Amounts in thousands of guilders.

Figure 3: Bank and bankers' guarantees



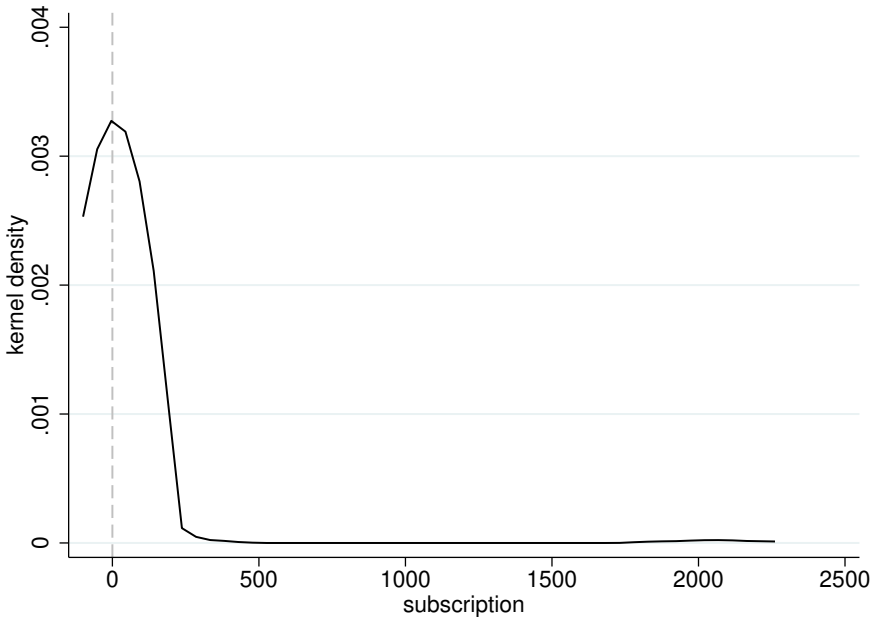
Note: This figure shows the predicted guarantee of the median director. The red line reflects the 1919-1925 step function, the blue line is the 1926-1930 step function. Throughout our period of analysis the directors of the bank alternate and consist of either 3 or 4 persons (excluding president and secretary). The median director is based on 1) the one director that is present in the sample throughout the period (Jacob Bierens de Haan) and 2) is corrected for deviations by one of the bank directors. That is, if this bank director underwrote a different amount than other directors, we use the median value of the directors. Bank and banker guarantees are in thousands of currency of issuance. Includes only observations where the bank is one of the lead underwriters. Bank guarantee is displayed in levels.

Figure 4: Within bin comparison

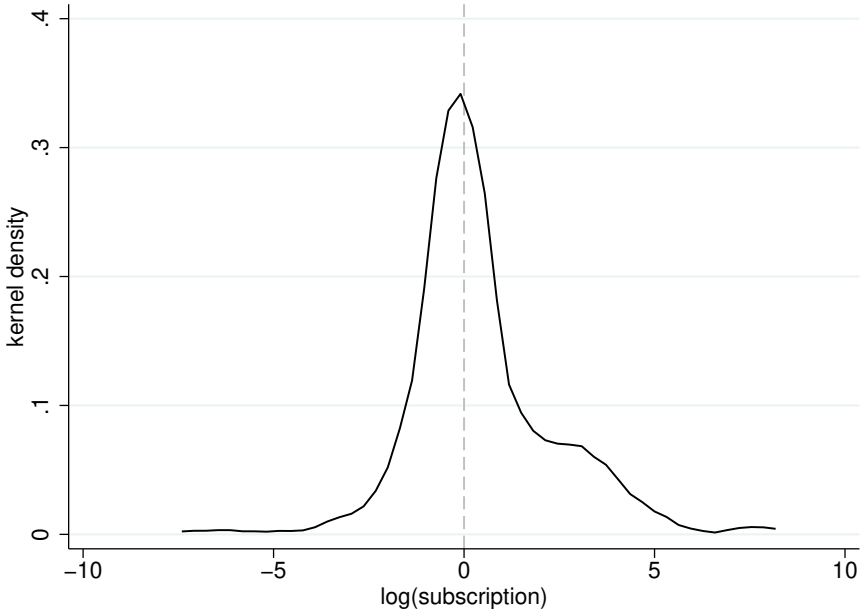


Note: This figure provides an example of some of the bins used in our regression analyses. We use bin fixed effects to compare observations within a bin, where the bank's guarantee is relatively similar while the banker's guarantee jumps around the discontinuity. The banker's guarantee displayed here is the median director's guarantee. The figure zooms in into 5 bins in the bank's guarantee range of 450.000 - 1.575.000. Each bin is defined from one middle point of a step until the next middle point. Vertical grey dashed lines reflect bin borders. The solid black line is the step function for 1926-1930. Bank and banker guarantee are thousands of the currency of issuance. Includes only observations where the bank is one of the lead underwriters.

Figure 5: Distribution of subscription rate of issuance



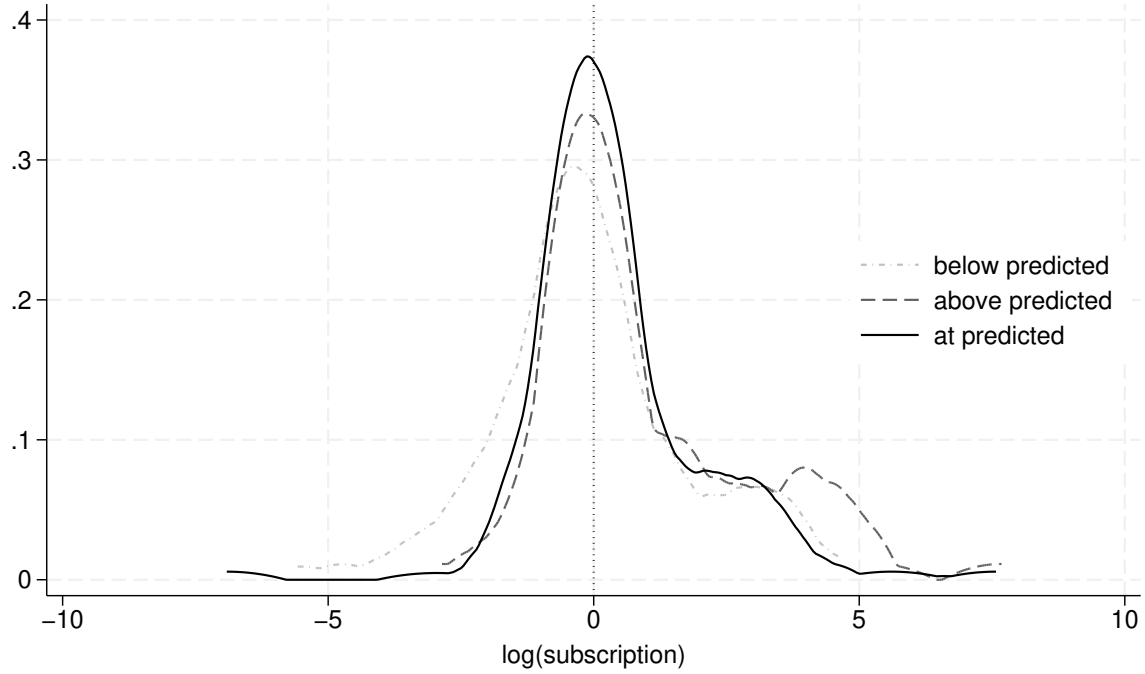
(a) Times subscribed to issuance



(b) Log(subscription rate) of issuance

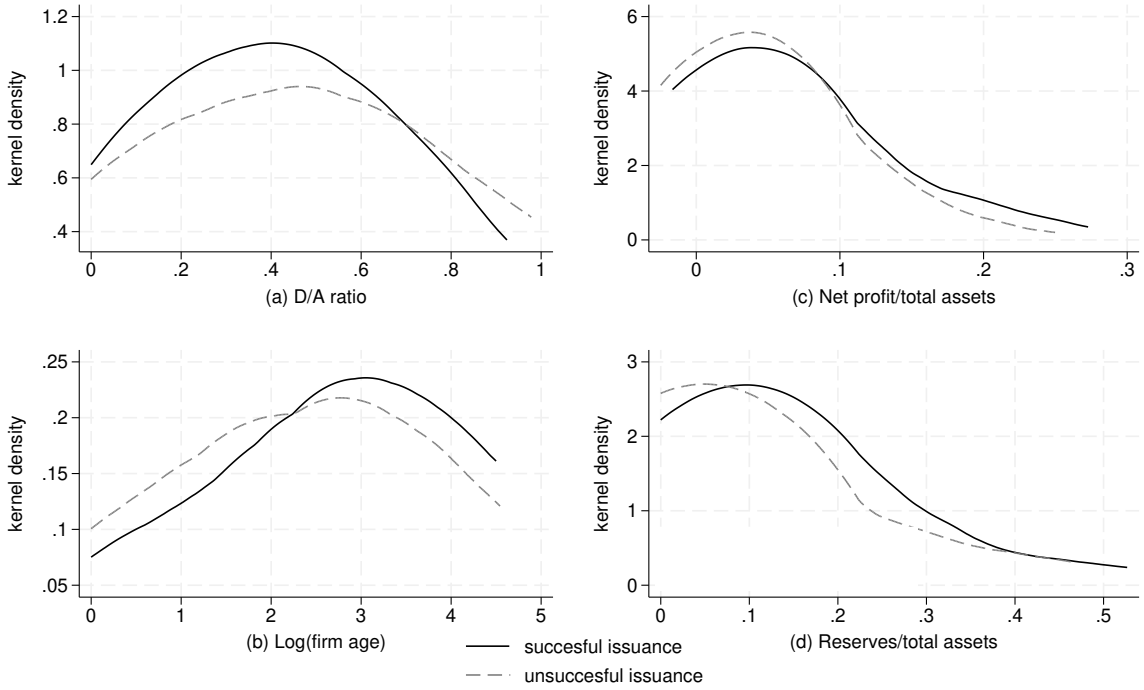
Note: The panels in this figure display the kernel density of our main dependent variable, the subscription rate. Panel (a) shows the actual subscription rate as ratio of the total securities outstanding at the security issuance. In this case, 1 means that the issue is fully subscribed. Panel (b) shows the log transformation of the subscription rate, where 0 means that the issue is fully subscribed. Both panels include all observations where the bank is one of the lead underwriters and the bank's guarantee does not exceed 5 million in the currency of issuance.

Figure 6: Banker guarantees and subscription to the issuance



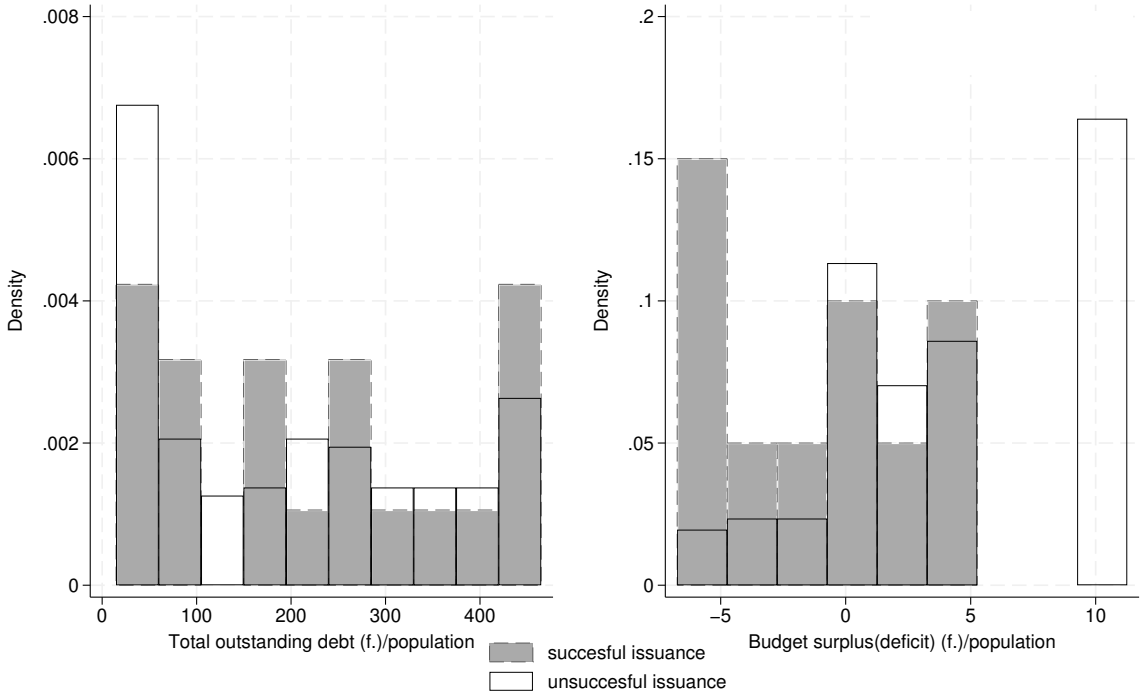
Note: This figure shows the kernel density of success of the issuance as log(subscription) for different sorts of bankers' guarantees. The solid line represents the issues where the bankers underwrite exactly the predicted amount. The dashed (dotted) line shows issues where the bankers' guarantees are higher (lower) than predicted. All mass right of the zero line is oversubscribed; all mass left of the zero is undersubscribed. Includes only observations where the bank is one of the lead underwriters and the bank's guarantee does not exceed 5 million in the currency of issuance.

Figure 7: Ex ante firm risk measures



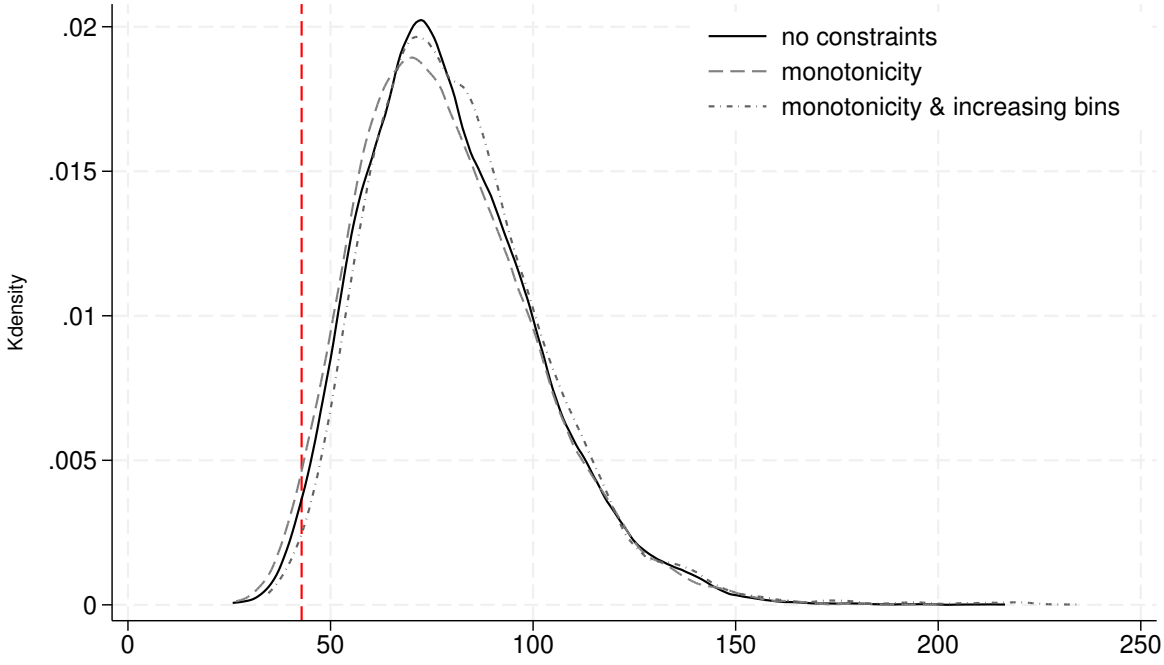
Note: The panels of this figure show the kernel density of balance sheet variables for issuing firms, split in security issues that were successful (solid line) versus issues that were not fully subscribed (dashed line). We consider every issuance above 90% subscription as successful. Panel (a) shows total debt over total assets of the issuing firm at the year before issuance. Panel (b) shows the logarithm of the age of the firm at the time of issuance (where all firms from 0-12 months are coded as age 1). Panel (c) displays the total reserves over total assets of the firm in the year before the security issuance. Panel (d) displays the profits (or losses) of the firm over total assets in the year before the issuance. All data are (balance sheet) information in the prospectus published before the security issuance, or if missing from 'Van Oss' Effectenboek' firm financial information book in the year of the issuance. All panels include only observations where the bank is one of the lead underwriters and the bank's guarantee does not exceed 5 million in the currency of issuance.

Figure 8: Ex ante public institutions risk measures

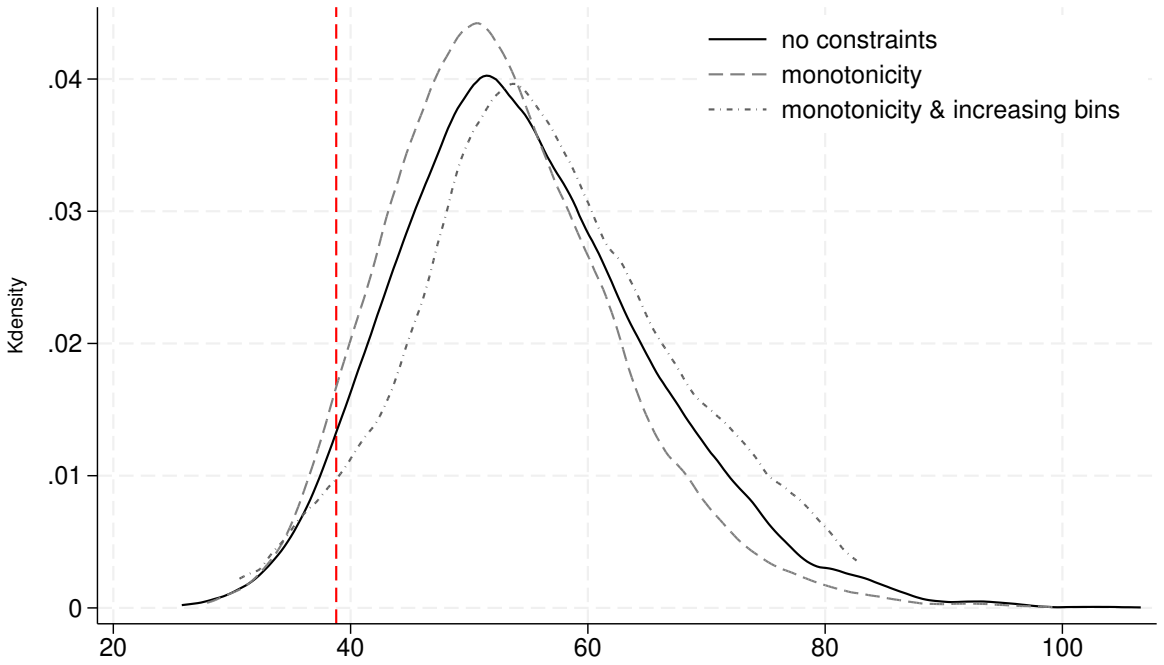


Note: The panels of this figure show the histograms of issuing (local) government's debt and deficit, split in security issues that were successful (solid black) versus issues that were not fully subscribed (dashed grey). We consider every issuance above 90% subscription as successful. Panel (a) shows total debt over the population of the respective government in the year before the issuance. Panel (b) displays the public surplus (deficit) of the (local) government in the year before the issuance, weighted by the population. Both variables are winsorized at 10% for visibility. All data are based on information in the prospectus published before the security issuance, or if missing from 'Van Oss' Effectenboek' in the year of the issuance. All panels include only observations where the bank is one of the lead underwriters and the bank's guarantee does not exceed 5 million in the currency of issuance.

Figure 9: Mean squared error distribution of counterfactual step functions



(a) Step function 1: 1919-1925



(b) Step function 2: 1925 - 1930

Note: The panels of this figure show the kernel density of mean squared errors of counterfactual step functions for period 1 (Panel (a)) and period 2 (Panel (b)). The vertical dotted line reflects the mean squared error of the step functions inferred from our data and used for the analysis. The solid line reflects the MSE distribution of counterfactual step functions without any imposed restrictions (N = 10,000 for both periods), the dashed line for step functions includes a monotonicity restriction (N = 9,987 for period 1 and N = 9,705 for period 2), and the dash-dot line includes both monotonicity restriction and requires non-decreasing bin size of the step function (N = 6,981 for period 1 and N = 508 for period 2).

Tables

Table 1: Overview of yearly security issuances guaranteed by the bank

Year	N	Stocks (%)	Foreign (%)	Guilders (%)	Government (%)	Successful (%)
1919	17	64.71	0.00	100.00	35.29	70.59
1920	18	61.11	11.11	100.00	22.22	61.11
1921	12	16.67	8.33	91.67	8.33	66.67
1922	3	33.33	33.33	100.00	33.33	33.33
1923	6	16.67	16.67	100.00	33.33	66.67
1924	6	16.67	50.00	66.67	83.33	83.33
1925	17	0.00	58.82	58.82	64.71	82.35
1926	28	14.29	71.43	50.00	35.71	75.00
1927	39	7.69	82.05	38.46	51.28	56.41
1928	42	26.19	71.43	42.86	30.95	45.24
1929	21	28.57	80.95	33.33	33.33	42.86
1930	34	5.88	79.41	58.82	20.59	52.94

Note: This table provides an overview of the security issues guaranteed in our main regression sample. The second column is the yearly number of unique bank guarantees. The other columns display the percentage of the security issues that were in stocks, from foreign issuers, in the domestic currency (guilders), (local)government and the percentage of issues that has been successful. It includes only the observations for which the bank is the one of the lead underwriters and where the total bank guarantee does not exceed 5 million in the currency of issuance.

Table 2: Summary Statistics

	Mean	SD	P1	P50	P99	N
Bank guarantee (x1000)	990.56	908.62	35.00	698.00	4175.00	1418
Actual banker guarantee (x1000)	20.13	21.68	0.00	14.00	100.00	1418
Predicted banker guarantee (x1000)	20.57	21.31	0.00	15.00	100.00	1418
Share of bank in syndicate (%)	0.34	0.25	0.08	0.25	1.00	243
Log(subscription)	0.41	1.84	-4.03	0.00	5.61	243
Times subscribed	25.21	187.53	0.02	1.00	273.42	243
Successful issuance dummy	0.59	0.49	0	1	1	243
Fully subscribed	0.50	0.50	0	0	1	243
Public sector dummy	0.36	0.48	0	0	1	243
Foreign dummy	0.59	0.49	0	1	1	243
Guilders dummy	0.59	0.49	0	1	1	243
Interlocked directorate dummy	0.15	0.36	0	0	1	243
Equity dummy	0.22	0.41	0	0	1	243
IPO dummy	0.03	0.17	0	0	1	243
Main bank dummy	0.17	0.38	0	0	1	243
First lead	0.70	0.46	0	1	1	243
Issuance/size	0.16	0.59	0.00	0.05	0.98	213
Age of firm at issuance	24.83	25.22	1.00	17.00	94.00	154
Reserves/total assets	0.10	0.12	0.00	0.05	0.50	169
Profit/total assets	0.05	0.06	-0.02	0.03	0.27	169
Leverage (D/A)	0.48	0.44	0.00	0.41	2.71	169
Leverage (D/E)	2.08	4.90	0.00	0.68	23.54	144
Public budget surplus (f)/population	-0.43	13.27	-42.93	1.13	15.61	36
Outstanding public debt (f)/population	228.59	196.71	5.14	198.24	683.87	55

Note: This table reports summary statistics for the main regresssion sample where the bank is one of the lead underwriters and the total bank guarantee does not exceed 5 million in the currency of issuance. The first three variables are reported on the banker-issuance level. All other variables are reported at the issuance level. Bank guarantee is the net guarantee of the bank, after extending amounts to syndicate members or sub-participants (excluding the bank's bankers). Share (%) of bank in the syndicate is the bank's guarantee divided by the total syndicate guarantee. Log(subscription) is the logarithm of the number of securities subscribed by market participants over the total of issued securities. If the issuance was fully subscribed, the log(subscription) is zero. Times oversubscribed is the number of times an issuance has been subscribed to. Successful issuance dummy is equal to 1 if the subscription rate was above 90%. Full subscription is a dummy that equals one if the subscription rate is 100% or higher. Dummies equal 1 (0) if public (private) sector security, foreign (domestic), issued in domestic (foreign) currency, one of the bankers has an interlocked directorate, dummy for stocks (bonds), dummy for IPOs, dummy if the bank is the main lender of the firm and a dummy if the bank is the first lead of the syndicate. Firm level variables have fewer observations, since the sample is also made up of (local) governments. Issuance/size is the total security issuance amount of the firm over its total assets measured in the year before. Reserves, profit and leverage are all weighted by total assets in the year before issuance. Leverage (D/E) is total debt weighted by total equity. The last two rows shows summary statistics for issuing (local) governments. Both outstanding debt and budget surplus(deficit) are in guilders and are weighted by the population in the year before the issuance.

Table 3: Balancing table

Variable	(1) Below discontinuity Mean/(SE)	(2) Above discontinuity Mean/(SE)	(1)-(2) Pairwise t-test Mean difference
Bank issuance guarantee (x1000)	933.155	1044.814	-111.659***
	(87.487)	(78.002)	
Actual banker guarantee (x1000)	17.206	22.899	-5.693***
	(1.810)	(1.937)	
Predicted banker guarantee (x1000)	16.981	23.964	-6.983***
	(1.696)	(1.984)	
Log(subscription)	0.151	0.683	-0.532*
	(0.140)	(0.186)	
Fully subscribed	0.443	0.547	-0.105*
	(0.046)	(0.045)	
Share of bank in syndicate	0.349	0.338	0.011
	(0.023)	(0.023)	
Public sector dummy	0.360	0.362	-0.002
	(0.045)	(0.043)	
Foreign dummy	0.576	0.604	-0.027
	(0.046)	(0.044)	
Guilders dummy	0.565	0.606	-0.042
	(0.046)	(0.044)	
Interlocked directorate dummy	0.132	0.163	-0.031
	(0.031)	(0.033)	
Equity dummy	0.248	0.195	0.053
	(0.040)	(0.036)	
IPO dummy	0.017	0.041	-0.024
	(0.012)	(0.018)	
Main bank dummy	0.179	0.162	0.017
	(0.036)	(0.033)	
First lead	0.679	0.730	-0.051
	(0.043)	(0.040)	
Number of bankers	4.917	5.442	-0.524
	(0.202)	(0.139)	
Observations	689	729	1418
Clusters	118	125	243

Note: This balancing table shows the means of the observations of our main regression sample below and above the discontinuities, collapsed to one level. Column 1 (2) reports the mean and standard deviation of observations below (above) each discontinuity. The pairwise t-test, displayed in the last column, includes bin fixed effects. Observations are clustered by issuance. Log(subscription) is the logarithm of number of securities subscribed to over the total outstanding in the issuance. Bank guarantee is the net guarantee of the bank, after extending amounts to syndicate members or sub-participants (excluding the bank's bankers). Log(subscription) is the logarithm of the number of securities subscribed by market participants over the total of issued securities. If the issuance was fully subscribed, the log(subscription) is zero. Full subscription dummy is equal to 1 if the subscription rate was equal to or above 100%. Share (%) of bank in the syndicate is the bank's guarantee divided by the total syndicate guarantee. Dummies equal 1 (0) if public (private) sector security, foreign (domestic), issued in domestic (foreign) currency, one of the bankers has an interlocked directorate, dummy for stocks (bonds), dummy for IPOs, dummy if the bank is the main lender of the firm and a dummy if the bank is the first lead of the syndicate. The number of bankers reflects the number of bankers personally underwriting in each issuance. This number varies over time due to the different number of bankers in the sample. It is included here to show that the number of bankers in the firm varied between 5 and 6. The table only includes observations for which the bank is one of the lead underwriters and where the total bank guarantee does not exceed 5 million in the currency of issuance.

Table 4: Bankers' guarantees and success of issuance, with fixed effects

	(1)	(2)	(3)	(4)	(5)
		(Co)-lead in syndicate			First lead
			OLS		
Actual banker guarantee (x1000)	0.027***	0.027***	0.030***	0.032***	0.032***
	(0.007)	(0.007)	(0.008)	(0.008)	(0.009)
R^2	0.186	0.259	0.262	0.281	0.279
			RF		
Predicted banker guarantee (x1000)	0.015**	0.015**	0.019**	0.021**	0.032**
	(0.007)	(0.007)	(0.009)	(0.010)	(0.013)
R^2	0.157	0.232	0.233	0.250	0.259
			IV 2nd stage		
Actual banker guarantee (x1000)	0.017**	0.017**	0.023**	0.026**	0.042***
	(0.008)	(0.008)	(0.011)	(0.011)	(0.016)
R^2	0.033	0.034	0.041	0.066	0.081
			IV 1st stage		
			Actual banker guarantee		
Predicted banker guarantee (x1000)	0.883***	0.889***	0.833***	0.814***	0.751***
	(0.096)	(0.089)	(0.113)	(0.111)	(0.132)
R^2	0.263	0.279	0.212	0.251	0.267
IV F-stat	84.07	99.31	54.83	53.86	32.48
Observations	1,418	1,418	1,418	1,418	1,000
Clusters	243	243	243	243	171
Bin FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Industry FE	N	Y	Y	Y	Y
Director FE	N	N	Y	Y	Y
Controls	N	N	N	Y	Y

Note: This table presents estimates of actual and predicted banker guarantees for log(subscription to the issuance) as a measure of quality of the securities underwritten by the bank. We only include the observations for which the bank is one of the lead underwriters and where the total bank guarantee does not exceed 5 million in the currency of issuance. Log(subscription) is the logarithm of the subscription to the security issuance, which are the securities sold at issuance over the total securities offered. The explanatory variables are the actual or predicted banker guarantee (in thousands of issued currency). The rows present the results for OLS, reduced form, and IV regression including the first stage. All specifications have bin and year fixed effects. Column (2) includes industry fixed effects, column (3) director fixed effects. Column (4) includes all controls and fixed effects, while (5) is the same specification as (4) but contains only observations where the bank is the first lead of the syndicate, i.e. appears first on the prospectus. Controls included in (4) and (5) are: bank share in syndicate, stocks, foreign, interlocked directorate, a main bank dummy and an IPO dummy. Standard errors (in parentheses) are clustered at the issuance-level. ***, ** and * indicate significance at 1, 5 and 10% level, respectively.

Table 5: Subscription to issuance for each type of director guarantee

VARIABLES	(1) Log(subscription) President	(2) Log(subscription) Director	(3) Log(subscription) Secretary
		OLS	
Actual banker guarantee (x1000)	0.027***	0.041***	0.058***
	(0.009)	(0.011)	(0.015)
R^2	0.233	0.245	0.250
		RF	
Predicted banker guarantee (x1000)	0.032*	0.040*	0.053*
	(0.016)	(0.021)	(0.027)
R^2	0.204	0.204	0.204
		IV 2nd stage	
Actual banker guarantee (x1000)	0.043*	0.050*	0.069*
	(0.024)	(0.027)	(0.037)
R^2	0.051	0.081	0.086
		IV 1st stage Actual banker guarantee	
Predicted banker guarantee (x1000)	0.753***	0.795***	0.772***
	(0.211)	(0.200)	(0.203)
R^2	0.169	0.185	0.177
IV F-stat	12.51	15.67	14.34
Observations	241	241	241
Bin FE	Y	Y	Y
Year FE	Y	Y	Y
Industry FE	Y	Y	Y
Controls	Y	Y	Y

Note: This table presents estimates of president, director and secretary underwriting that are part of the bank's executive board throughout the period of analysis. The dependent variable is the logarithm of the subscription to the security issuance. We only include the observations for which the bank is one of the lead underwriters and where the total bank guarantee does not exceed 5 million in the currency of issuance. The rows present the results for OLS, RF, and IV regression including the first stage. All columns include the following set of controls: bank share in syndicate, dummy for public, stocks, foreign, interlocked directorate, a main bank dummy and an IPO dummy. All columns include bin, year and industry fixed effects. Robust standard errors are in parentheses. ***, ** and * indicate significance at 1, 5 and 10% level, respectively.

Table 6: Firm balancing table

Variable	(1) Below discontinuity Mean/(SE)	(2) Above discontinuity Mean/(SE)	(1)-(2) Pairwise t-test Mean difference
Bank issuance guarantee (x1000)	761.805	1031.926	-270.121***
	(87.662)	(98.740)	
Actual banker guarantee (x1000)	16.323	24.683	-8.361***
	(2.036)	(2.524)	
Predicted banker guarantee (x1000)	14.222	23.720	-9.498***
	(1.841)	(2.528)	
Log(subscription)	0.099	0.739	-0.639
	(0.206)	(0.250)	
Fully subscribed	0.383	0.557	-0.174**
	(0.058)	(0.058)	
Log(age company at issuance)	2.571	2.489	0.081
	(0.167)	(0.160)	
Leverage (D/A)	0.444	0.418	0.026
	(0.031)	(0.033)	
Leverage (D/E)	2.687	1.564	1.123
	(0.790)	(0.305)	
Reserves/total assets	0.099	0.124	-0.025
	(0.013)	(0.016)	
Profit/total assets	0.054	0.052	0.003
	(0.007)	(0.008)	
Share of bank in syndicate	0.391	0.359	0.031
	(0.035)	(0.034)	
Foreign dummy	0.483	0.590	-0.106**
	(0.059)	(0.058)	
Guilders dummy	0.667	0.618	0.050
	(0.056)	(0.057)	
Interlocked directorate dummy	0.218	0.263	-0.046
	(0.049)	(0.052)	
Equity dummy	0.395	0.317	0.078
	(0.058)	(0.055)	
IPO dummy	0.029	0.056	-0.027
	(0.020)	(0.027)	
Main bank dummy	0.294	0.261	0.033
	(0.054)	(0.052)	
First lead	0.711	0.730	-0.019
	(0.054)	(0.052)	
Observations	418	429	847
Clusters	72	74	146

Note: The balancing table covers the firm underwriting sample. Column 1 (2) reports mean and standard deviation of observations below (above) each discontinuity. The pairwise t-test includes bin fixed effects. Observations are clustered by issue. All variables used in our main sample have the same definition as in previous tables. Issuance/size is the total security issuance amount of the firm over its total assets in the year before. Reserves, Profit and leverage are all weighted by total assets in the year before issuance. Leverage (D/E) is total debt weighted by total equity. Due to missing values, leverage ratio debt/equity has 412 (71 clusters) observations below the discontinuity and 411 (71 clusters) above, while all other variables have 418 below and 429 above. The table includes only observations where the bank is one of the lead underwriters and where the total bank guarantee does not exceed 5 million in the currency of issuance.

Table 7: Bankers' guarantees and firm risk

VARIABLES	(1) Log(subscription)	(2) Log(age)	(3) Leverage	(4) Reserves	(5) Profit
			OLS		
Actual banker guarantee (x1000)	0.044***	0.005	-0.174	0.112	-0.027
	(0.016)	(0.007)	(0.148)	(0.092)	(0.028)
R^2	0.395	0.453	0.475	0.451	0.571
			RF		
Predicted banker guarantee (x1000)	0.032**	0.006	-0.084	0.127	0.034
	(0.014)	(0.009)	(0.192)	(0.135)	(0.038)
R^2	0.368	0.452	0.472	0.448	0.570
			IV 2nd stage		
Actual banker guarantee (x1000)	0.039**	0.007	-0.102	0.156	0.042
	(0.018)	(0.011)	(0.231)	(0.161)	(0.047)
R^2	0.061	0.259	0.266	0.120	0.077
			IV 1st stage		
Predicted banker guarantee (x1000)			0.816***		
			(0.094)		
R^2			0.303		
IV F-stat			74.96		
Observations	847	847	847	847	847
Clusters	146	146	146	146	146
Bin FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Director FE	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y

Note: This table presents estimates of actual and predicted banker underwriting for (1) subscription to the issuance, firm (2) age, (3) leverage, (4) reserves and (5) profit. We only include the observations for which the bank is the lead underwriter and where the total bank guarantee does not exceed 5 million in the currency of issuance. Log(subscription) is the logarithm of the subscription to the security issuance, which are the securities sold on the stock market over the total securities offered. Log(age) is the logarithm of the age of the firm at the time of issuance (where all firms from 0-12 months are coded as age 1). The dependent variable in column (3)-(5) is multiplied by 100 for presentational purposes and to interpret the coefficients as percentage point changes. Leverage is the ratio total debt over total assets, both in the year before the security issuance. Reserves are scaled by total assets, both in the year before issuance. Profit are scaled by total assets and reflect the profit (or loss) reported by the firm over total assets in the year before the issuance. All specifications include the same set of controls (bank share in syndicate, stocks, foreign, interlocked directorate, a main bank dummy and an IPO dummy). All columns have fixed effects: bin, year, industry and director. Standard errors (in parentheses) are clustered by issuance. ***, ** and * indicate significance at 1, 5 and 10% level, respectively.

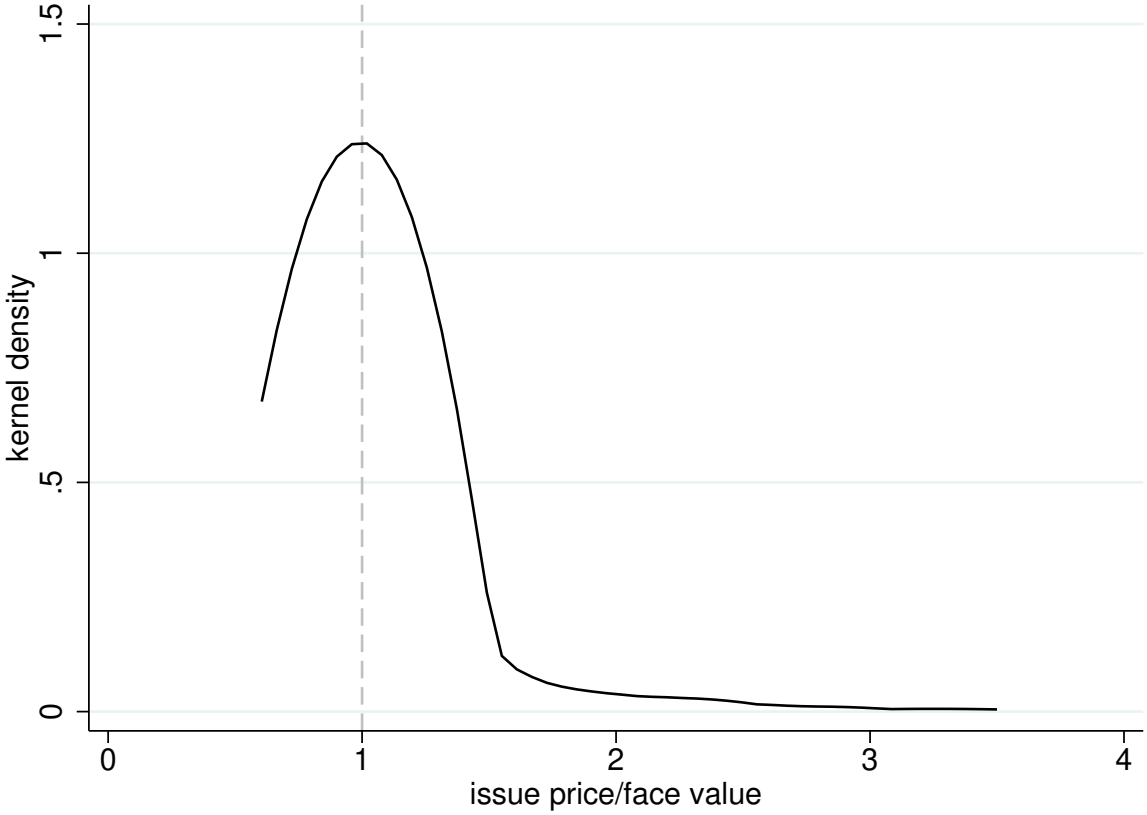
Table 8: Buy-and-hold abnormal returns above and below an underwriting discontinuities

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Baseline			Industry FE			Industry FE + Controls		
	Buy-and-hold abnormal returns								
	0m	1m	2m	0m	1m	2m	0m	1m	2m
Above underwriting discontinuities	0.021	0.030*	0.047*	0.015	0.024	0.040	0.015	0.024	0.034**
	(0.015)	(0.016)	(0.026)	(0.014)	(0.015)	(0.025)	(0.013)	(0.015)	(0.016)
Observations	194	186	186	193	185	185	193	185	185
R-squared	0.651	0.590	0.497	0.687	0.631	0.530	0.693	0.637	0.641
Bin FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry FE	N	N	N	Y	Y	Y	Y	Y	Y
Controls	N	N	N	N	N	N	Y	Y	Y

Note: This table presents regressions of buy-and-hold abnormal returns (BHAR) for underwritten securities, calculated over horizons of 0 (issuance month), 1, and 2 months after issuance and computed as the cumulative simple return of the security minus the cumulative return of the market index over the same horizon. We regress the BHARs on dummy for whether the security had a guarantee above an underwriting discontinuity. Specifications (1)-(3) includes bin and year fixed effects. Specifications (4)-(6) adds industry fixed effects. Specification (7)-(9) additionally includes control variables: a dummy for domestic currency, rights issue, and a dummy equal to one if the security has been liquidated during the period of analysis. Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1, 5, and 10% level, respectively.

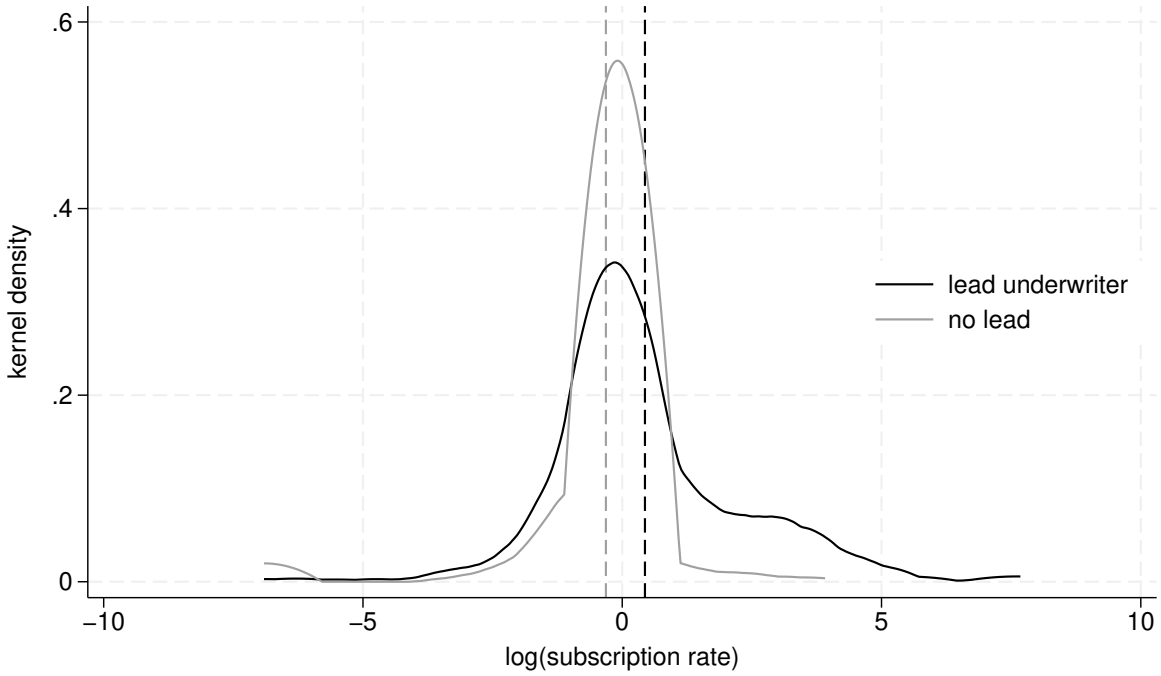
Appendix A1

Figure A1: Issue price as a ratio of face value



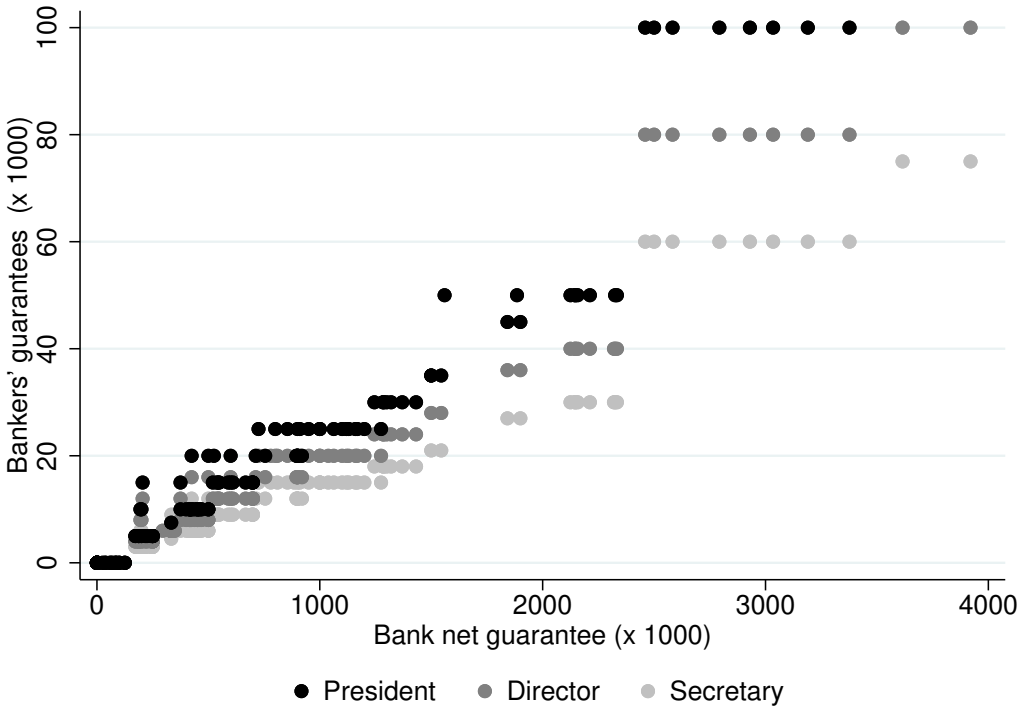
Note: This figure shows the kernel density of the issue price of the security issuance over the face value. This is the ratio of the price at which the securities are bought by the bank over the price at which the securities are sold to the market. Most issue prices are around par. Includes all observations where the bank is one of the lead underwriters and the bank's guarantee does not exceed 5 million in the currency of issuance.

Figure A2: Success of the issuance for participating or leading a syndicate



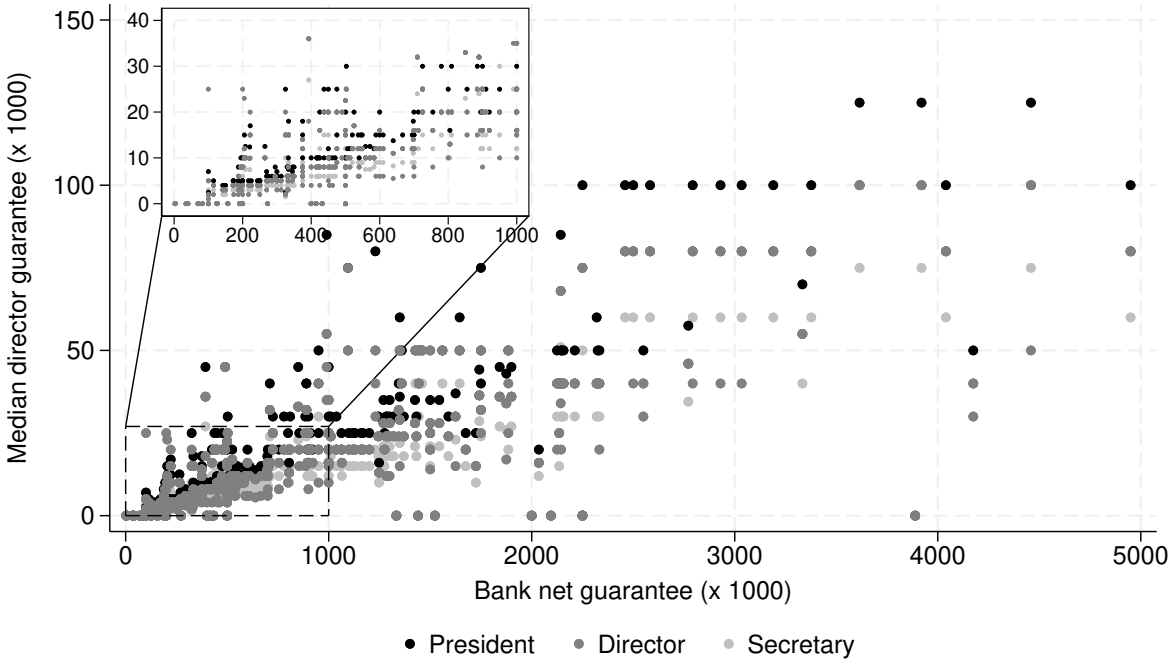
Note: This figure shows the distribution (kernel density) of the success of the security issues by leading or participating in a syndicate. Log(subscription) is the logarithm of the subscription to the security issuance, which are the securities sold on the stock market over the total securities offered. The black (dashed) line reflects the observations (mean) of bank lead underwriting issues, while the grey (dashed) line reflects observations (mean) of bank participations in other syndicates. Includes all observations where the bank is one of the lead underwriters and the bank's guarantee does not exceed 5 million in the currency of issuance.

Figure A3: Bank and bankers' guarantees at step function



Note: This figure shows the observations in our sample where the bankers follow exactly the step function. The figure shows guarantees for the president (black), median director (mid grey) and secretary (light grey). The bankers' guarantees are shown in thousand guilders. Bank guarantees are in thousands of guilders where bankers follow the step functions with ratio 60-80-100. Includes all observations where the bank is one of the lead underwriters and the bank's guarantee does not exceed 4 million in the currency of issuance.

Figure A4: Bank and bankers' guarantees



Note: This figure shows all the observations used in our regression sample. It shows guarantees for the president (black), median director (mid grey) and secretary (light grey). The bank and banker guarantees are in thousands of guilders. Includes all observations where the bank is one of the lead underwriters and the bank's guarantee does not exceed 5 million in the currency of issuance.

Appendix A2

We simulate counterfactuals for both periods separately, as we find two different rules in our dataset. To maximize comparison across different rules, we impose the same restrictions on the counterfactuals as on our own data, as explained in section 3.2 of the paper: 1) no overlap between steps, 2) monotonic jumps at the discontinuities, 3) steps can only increase in size, 4) board connection should not be taken into consideration. Restriction 1-3 are explicitly coded, while restriction 4 is met when using the median banker. Additionally, we exclude the zero banker guarantees from the clustering if the bank guarantee is above f. 150,000. Figure A5 shows the discontinuity of the banker guarantee below and above the bank guarantee of f. 150,000. Restriction 5 and 6 are not explicitly imposed in our counterfactual datasets but will hold most of the time. We use only the median banker.

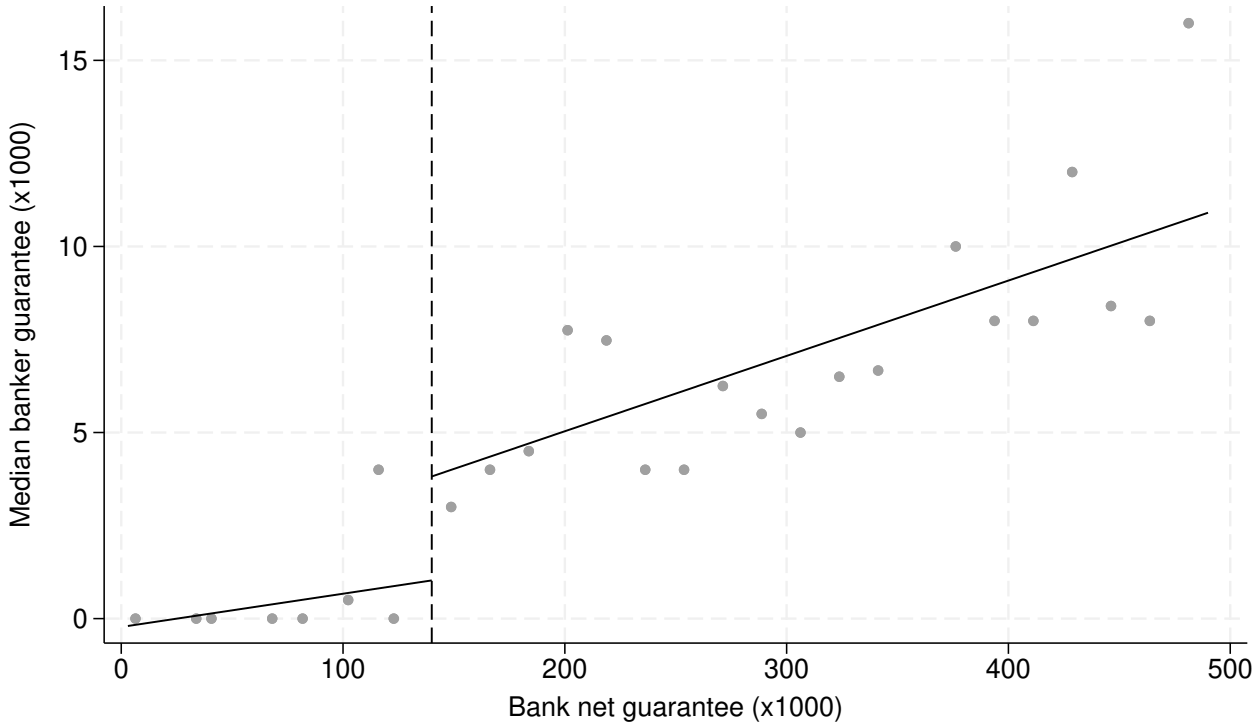
Using our own data, we simulate 10,000 counterfactual banker guarantees. We estimate a first simple OLS regression of banker guarantees on bank guarantees for each period separately and store the intercept, slope and error terms. Since our errors are het-

eroskedastic, we impose the same distribution of our error terms on the counterfactuals: we estimate a second regressions with the squared residuals of the first regression on the bank guarantee and store the residuals. We then randomly draw 10,000 counterfactual banker guarantees using the estimated intercept and slope from the first regression together with the randomly drawn error term (which has mean 0 and standard deviation based on the stored residuals of our second regression). Since our original data has no negative banker guarantees, we replace the negative counterfactual with zero. We round the banker counterfactuals to the nearest actual banker guarantee, to closely imitate our own data. Finally, we set the value of the banker guarantee to zero when the bank guarantee is above f. 150,000.

We cluster the banker and bank guarantee using the number of clusters of our own data: 8 for 1919-1925 and 13 for 1925-1930. To incorporate restriction 1-3 from our own step function, we find the optimal step function to the counterfactual datasets using 3 methods: a) no restrictions), b) monotonicity (restriction 2) and c) both monotonicity and progressive bins (restriction 2 and 3). We address the first restriction, no overlap, later. We first apply clustering multiple times for each of the 10,000 counterfactuals, to maximize the chances of having a counterfactual step function. We increase the number of clustering attempts if we impose another restriction: a) gets 2 attempts per counterfactual, b) gets 20 attempts, c) gets 200 attempts. If after these attempts of clustering, step function conditioned on our restrictions cannot be found, we set this counterfactual to missing and assume it has performed worse (i.e. a higher MSE) than our own step function. If multiple clustering variables remain after imposing restriction b) and c), we choose the counterfactual step function with the lowest MSE. For method a), without any restrictions, N = 10,000 for both periods. For b) the monotonicity restriction leaves N = 9,987 for period 1 and N = 9,705 for period 2. For c), both monotonicity and progressive bin size results in N = 6,981 for period 1 and N = 508 for period 2.

We address the possible overlap (restriction 1) for the remaining unique counterfactual step function as follows: If clusters have overlap, we reassign the overlapping observations to one of the two cluster based on the lowest mean squared error. We then compute the MSE of the counterfactual step function with the counterfactual banker guarantee. Using no constraints, our step function of the first(second) period outperforms random counterfactual datasets 98% (95%) of the time (p = 0.0144 (0.0486)). When using the monotonicity constraint our step function of the first (second) period outperforms 97% (95%) of the time (p = 0.028 (0.0558)). Finally when including both the monotonicity and the increasing bins constraint, our step function of the first (second) period outperforms the counterfactual datasets 99% of the time (p = 0.006; p = 0.0018).

Figure A5: Bank and bankers' guarantees discontinuity



Note: This figure shows the RD plot of the bank net guarantee with a cutoff at f. 150,000. The RD plot has 8 bins below the cutoff and 20 above. Bank and banker guarantees are in thousands of currency of issuance. Includes only observations where the bank is one of the lead underwriters.